CALIFORNIA
# OIL WORLD
## and Petroleum Industry

PUBLISHED TWICE A MONTH — ENGINEERING — TECHNOLOGY — LATEST NEWS

SECOND ISSUE
JULY 1943
VOL. 36 NO. 14
WHOLE NO. 1637

UNITED STATES TREASURY DEPARTMENT

*For distinguished services rendered in behalf of the War Savings Program this citation is awarded to*

**California Oil World & Petroleum Industry**

*Given under my hand and seal on* June 12, 1943

Henry Morgenthau Jr.
SECRETARY OF THE TREASURY

*In the service of our country*

## IN THIS ISSUE

| | Page |
|---|---|
| Administrative Highlights | 3 |
| Pop Safety Valves in Compressor Cylinder Service | 9 |
| Crude Oil Prices and Conservation | 17 |
| Los Angeles Basin Developments | 27 |
| Coastal Counties Developments | 29 |
| San Joaquin Valley Developments | 31 |

PETROLEUM PUBLISHERS, INC. 939 SO. BROADWAY BLDG.
LOS ANGELES, CALIFORNIA-MEMBER OF THE AUDIT BUREAU OF CIRCULATIONS

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California Oil World and Petroleum Industry is published twice a month at 1009 in the 939 So. Broadway Bldg., Los Angeles, California. Entered as Second-class Matter January 16, 1937, at the post office at Los Angeles, California, under the Act of March 3, 1879. Subscription price $1 per year in U. S. and Possessions, $2 in foreign countries, including Canada. Member of the Audit Bureau of Circulations.

July 27th, 1943

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# Administrative Highlights •

## P-98-b Amended

Preference Rating Order P-98-b, under which the petroleum industry secures priorities assistance in obtaining materials, was amended on July 9th, effecting six important changes.

1. The Petroleum Administration for War is authorized by the War Production Board to issue, in its own name, further restrictions or limitations on the use of priorities assistance by operators in the petroleum industry. See new paragraph (p).

2. Production Operators must now file a copy of delivery orders on Controlled Materials, as well as on non-controlled, e.g., one copy of the delivery order must be filed, but approval by PAW is not required, where total cost of all items is less than $1,000 and more than $100, with no single item $500 or more; two copies of delivery order must be filed and advance approval obtained, where total cost of all items is $1,000 or more, or where any single item is $500 or more. See paragraph (f)(5) and (f)(7).

Compliance with this requirement will enable production operators to make full use of PAW's allotment of controlled materials for oil country tubular goods. Under the Controlled Materials Plan it has become increasingly necessary that the petroleum industry be able to take full—not just partial—advantage of PAW's controlled material allotments.

3. MRO materials to be used in retail marketing (service station) operations are restricted to an AA-5 priority rating, instead of the AA-1 rating formerly authorized. This change brings P-98-b into harmony with recent changes in CMP Regulation No. 5 which affects all retail distribution. See paragraph (d) (1).

4. Materials used in petroleum research or technical laboratories, other than for construction of laboratory buildings or structures, are now classified as MRO materials and therefore carry a priority rating of AA-1. This change brings P-98-b into harmony with recent amendments to WPR Orders P-43 and L-144. See paragraphs (b)(11) and (d)(1).

5. Participation in PAW Materials Redistribution Program No. 2 is now a prerequisite for the use of priorities assistance to obtain deliveries on and after August 1, 1943, if the operator is required by the terms of the Materials Redistribution Program to be a participant. See paragraph (n)(6).

6. Schedule "C" of the former order, controlled by paragraph (c)(2), has been amended and the list of items formerly set forth under that schedule has been eliminated. In place thereof, the operator is referred to Priorities Regulation No. 3, paragraph (f) and Lists "A", "B" and "C", which now control.

The lists set forth in Priorities Regulation No. 3 consist of three groups of materials items:

"A"—those for which no preference rating is required.

"B"—those for which MRO ratings under P-98-b may not be used.

"C"—those for which specific preference ratings are given, or which may be obtained only by proceeding along lines set forth in specific WPB Orders which are listed immediately alongside the item for which they are controlling.

The old Schedule "F" under P-98-b contained a list of items which could not be obtained by using preference ratings otherwise authorized under the Order, but which required either special procedure or not preference rating at all. This list was necessarily incomplete and was subject to constant change as a result of the impact of the war program on various materials.

Under such circumstances, revision of P-98-b would have been required with every change affecting any of the items on old Schedule "C". By substituting reference to Priorities Regulation No. 3, paragraph (f), Lists "A", "B" and "C", petroleum operators need only keep abreast of changes in that Regulation, which automatically becomes part of P-98-b.

---

Action to mobilize and redistribute surplus materials within the petroleum industry so that all existing material will be used with maximum efficiency in achieving the industry's war objectives, was called for on July 9th by the Petroleum Administration for War in announcing the details of "Materials Redistribution Program No. 2."

Under the new program, surplus materials are divided into two groups, one of which is classified as critical materials and itemized in Schedules "A", "B", and "C" in the regulation. Surplus material, not itemized in the schedules, is defined as any quantity not required or scheduled for use during the succeeding ninety days. Surplus critical materials itemized in Schedules "A", "B", and "C" are listed and defined as follows:

**Schedule "A"—(Defined as Surplus Material If Not Required For Use During Next 90 Days.)**

Carbon or Alloy Steel:—line pipe

**McCullough**
**GUN PERFORATOR**
**COMPLETION METHODS**
**Brown Line Print NO. 2**

# Set Thru To CONTROL GAS/OIL RATIOS

Set the casing thru the oil and gas zones and cement the string solid. Then gun perforate the oil and gas zones, adjusting the number of holes placed opposite the gas zone to control the amount of gas admitted. The solid cement sheath also protects and supports the casing and eliminates water entry.

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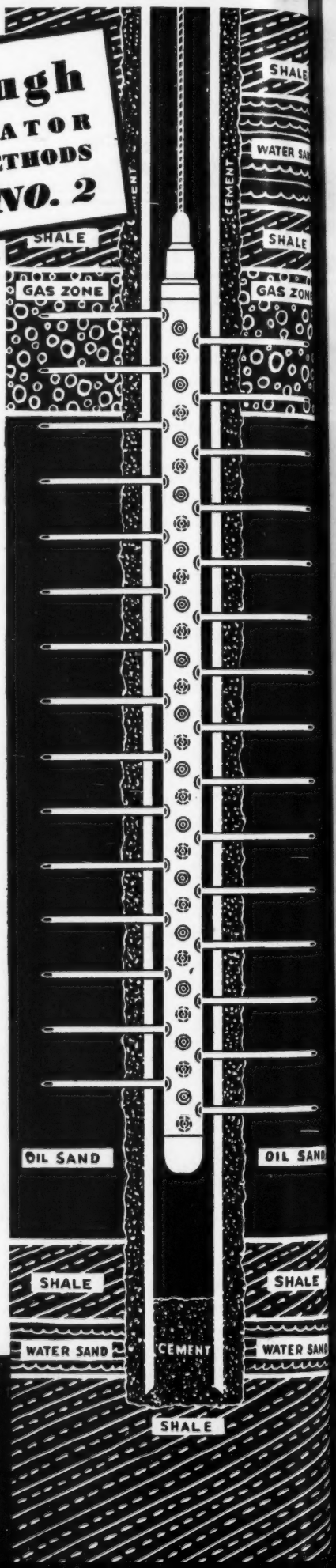
*Hard Shooting-exact SPACING*

# McCullough

## GUN PERFORATOR




## 16 SERVICE LOCATIONS

McCULLOUGH TOOL COMPANY . . . 5820 South Alameda Street, Los Angeles, California

HOUSTON, TEXAS
WICHITA FALLS, TEXAS
VICTORIA, TEXAS
CORPUS CHRISTI, TEXAS
GEO. WEST, TEXAS
TYLER, TEXAS
SHREVEPORT, LA.
HOUMA, LA.
LAKE CHARLES, LA.
OKLAHOMA CITY, OKLA.
SEMINOLE, OKLA.
CASPER, WYOMING
BAKERSFIELD, CALIF.
VENTURA, CALIF.
AVENAL, CALIF.

—casing — tubing — sucker rods—wire rope.

**Schedule "B"—(Surplus Material herein is defined as Any Excess Over 50 Per Cent of Quantity of Item Actually Put Into Use in 1942.)**

Carbon or Alloy Steel:—condenser, boiler or still tubes.

Copper or Copper Base Alloy:—wire, tubing or pipe.

Valves, New, Reconditioned or Rebuilt:—2 inch or up if steel, 12 inch or up if cast iron. Check, gate, globe, plug, relief or safety valves.

**Schedule "C"—(Defined as Surplus Material If Has Not Been In Service For 90 Days and Not Scheduled For Use in 30 Days,** or

**Surplus Material If Has Not Been In Use For 180 Days.)**

Compressors—75 HP and up for Production operators, 200 HP and up for Refining and Natural Gasoline operators.

Electric Motors and Controls—10 HP and up for all operators except Marketing, 5 HP and up for Marketing.

Diesel Engines—150 HP and up, if sold new after December 31, 1937.

Gas & Gasoline Engines—Multicylinder—10 HP and up, if sold new after December 31, 1937.

Control Instruments — Natural Gasoline and Refining operators, industrial control instruments, including regulators and control valves, if sold new atfer December 31, 1937.

Heat Exchangers—Natural Gasoline and Refining operators, also complete shells.

Line Pipe In Place—4 inches and over.

Meters—Marketing operators, displacement type.

Pressure Vessels and Towers—Natural Gasoline and Refining operators, 200 cubic feet content or more.

Meter Type Dispensing Pump, Motor Driven—Marketing operators.

Pumps—If sold new after December 31, 1937, steam or power driven—centrifugal, rotary or horizontal reciprocating, where pump ex power unit has new replacement cost of $600 or more.

Oilwell Pumping Units—10 HP or more, excluding standard rig front.

Steel Tanks—Marketing operators, 65 gallons or larger.

Steel Tanks—Production, Natural Gasoline, Refining and Transportation operators, 10,000 barrels or larger.

All operators in the petroleum industry, except certain defined classes of small marketers, must join the program and certify to the acceptance of its conditions. After July 31, 1943, no operator may obtain priorities assistance unless he is a participant under this program, or is in the excepted group.

Marketers who operate less than five bulk plants and who do not own or control service station marketing equipment with a new replacement value of $300 or more at each of twenty-five or more retail outlets are not required to join the program.

Participants must file reports of surplus critical materials on PAW Form Ma-3A in triplicate with the PAW District Office for the district in which the material is located. The first report must be filed on or before July 31, 1943. Revised reports must be filed thereafter at least every ninety days, except as provided in the first part of Section (e)-(3)-(ii).

Operators applying for priorities assistance to secure materials will be informed by PAW of the location of available surplus materials. Unless the applicant notifies PAW within fifteen days that, for valid reasons, he was unable to secure the surplus materials, the priorities application will become void.

Explaining the relationship of the PAW program to the War Production Board materials redistribution program, Deputy Administrator Ralph K. Davies said:

"Issuance of PAW Materials Redistribution Program No. 2 supersedes the operative effect of the War Production Board's material redistribution programs, so far as petroleum operations are concerned. This is true whether the operator is a domestic or a foreign operator.

"The basis of the adjustment between the programs lies in the cooperative efforts of the WPB and PAW to develop a program adapted to the peculiar needs of the petroleum industry, which will at the same time meet the overall objectives of the program issued by the War Production Board."

## WPB Grants Higher Priorities

Action by the War Production Board on July 9th in granting a higher priority rating for the 100-octane aviation gasoline plants that are scheduled for completion in 1943 was hailed by Acting Petroleum Administrator for War Ralph K. Davies as "a real help in the advancement of this all-important program."

Although security considerations prevent revelations of the names of the companies involved, or the locations and capacities of the plants, Mr. Davies described the WPB action in raising the priority for a number of plants from AA-2X to AA-1 as "a most significant and heartening change in the 100-octane situation." He commented:

"The decision of the WPB has the effect of placing most of the 100-octane program on the same priority level as the other military 'must' programs, such as aircraft and escort vessels.

"A number of the new facilities have already been completed and many more have been working for some months on the basis of the highest military priority, that is, an AA-1 rating. Certain of these plants have had further assistance in the form of special directives which tend to re-emphasize the higher rating.

"However, a large number of plants, the total productive capacity of which is more than double our prewar total productive capacity, have been laboring under the disadvantage of an AA-2X priority. We shall be able to proceed with increased speed, now that WPB has agreed to raise the rating of these plants to AA-1.

# OUR *check* OF THESE

# 7 *vital maintenance and repair needs*

## LEADS TO INCREASED LIFE AND EFFICIENCY OF *any make* COOLING TOWER

**1** Condition of decks or filling.

**2** Condition of flumes or distributing system.

**3** Analysis of water loading for optimum performance.

**4** Analysis of net effect of recycling.

**5** Condition of stair treads, ladder rungs and hand rails.

**6** General condition of structure.

**7** Condition of mechanical equipment (motors, fans, gears, flexible couplings, etc.)

To get colder water from your present cooling tower, *regardless of make or type,* consider these *Maintenance* and *Repair* needs now. (1) Sagging decks cause channeling, prevent water break-up, thus decreasing cooling. (2) Warped flumes or a faulty distributing system result in unbalanced distribution of water through the tower, producing higher temperatures. (3) Water overloading or under-loading may decrease heat dissipation, thus lowering cooling efficiency. (4) Excessive recycling decreases the cooling capacity of incoming air. (5) Rotted or broken stair treads, ladder rungs, or hand rails cause accidents. (6) Lumber delignification may be weakening the entire tower structure. (7) Improperly adjusted mechanical equipment causes unbalanced air-water ratio, resulting in burned out motors, damaged fans and stripped gears.

These conditions may exist in *your* cooling tower.

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"For more than a year the Petroleum Administration has been pressing on every front toward the adoption of a mandatory scheduling procedure for the parts needed not only for the 100-octane program but for all 'must' programs. Under this scheduling procedure, raw material is made available to fabricators to produce the vessels and other component parts of the plants under such conditions that they can complete the requisite parts on an exact time schedule. The fabricators are, in turn, ordered by the WPB to deliver the completed parts to the correct plants in the order of preference shown on a sequence list.

"Commencing last Spring, the WPB adopted this policy, but it takes a long while to take effect, because of the hundreds of thousands of items necessarily involved. We have been working with the WPB in scheduling the delivery of all of the parts for all of the plants whatever their priority rating.

"However, the day to day requirements of the Air Forces for 100-octane gasoline continue to rise and we have felt for some time that the situation needed the most drastic treatment including the granting of the highest priorities as well as scheduling.

"Even with the WPB action in granting AA-1 priorities for plants to be completed this year, there is an important segment of our program which has not yet been granted any priority higher than AA-2X, namely, the 100-octane installations which are scheduled to be finished during 1944. We have agreed to work with the WPB toward the complete scheduling of all items required by these plants and at a later date we will determine our own opinion as to whether they can be built successfully on the AA-2X priority. If not, we shall again press a request for those plants also."

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## Davies Issues Supplementary Order 6 to PAO 11

To facilitate the extremely important program for secondary recovery of crude oil throughout the country, Deputy Petroleum Administrator Ralph K. Davies on July 2nd issued Supplementary Order No. 6 to Petroleum Administrative Order No. 11 which will permit petroleum operators to acquire and use materials in secondary recovery operations without regard to the restrictions otherwise imposed by PAO No. 11.

Commenting on the amended order, which supersedes a temporary order which expired on June 30, Mr. Davies stressed the importance of secondary recovery operations as a source of an additional supply of crude oil to meet our constantly expanding requirements.

"Secondary recovery means getting more of the oil which we know is in the ground," the Deputy Administrator explained, adding:

"It is especially important, in view of the disappointing new discovery records of recent years, that we exert our efforts and ingenuity to increase secondary recovery production at this time. The Petroleum Administration hopes that operators will take early advantage of the authorization included in this supplementary order to inaugurate an unprecedented number of secondary recovery projects.

"Secondary recovery operations are, of course, considerably more costly than primary production operations and it is realized that the existing crude oil price level is not favorable toward the initiation or conduct of these operations. This is one of the important reasons which have led the Petroleum Administrator to recommend a general upward adjustment in the crude oil price ceiling."

Under the terms of the Order, secondary recovery operations involve the injection of air, gas, or water into the producing formation for the purpose of increasing or sustaining production therefrom, and include the drilling of production and injection wells. Pressure maintenance, high pressure cycling, and salt water disposal are specifically excluded from the definition of secondary recovery.

The authorizations under the amended order extend only to an operator who conducts the specific injection program, or who contributes money, property, or service as a participant in a specific secondary recovery program. The authorization for drilling of production wells extends only to such operations conducted within a radius of two thousand feet of any air or gas injection well or within a radius of one thousand feet of any water injection well.

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## Cumming Authorized To Issue Directive

Authority to issue operating directives to petroleum refiners has been delegated by Deputy Petroleum Administrator Ralph K. Davies to E. D. Cumming, PAW's Director of Refining, Mr. Davies announced on July 13.

The delegation is expected to make for more expeditious operation since any appeal for exception to refinery directives will be handled directly and in the first instance by the Refining Director.

Text of the delegation follows:

"Pursuant to the authority contained in Section 7 of Executive Order 9276 as Amended by Executive Order 9319, you are hereby authorized to take the following action in your own name as Director of Refining of the Petroleum Administration for War:

"You may issue to the refiners in the various Districts, by telegrams or otherwise, necessary operating directives relating to the extent and character of refinery operations, including without limitation directives as to the permissive amounts of crude to be run and products to be made therefrom under Plan 15 and such other Plans, Orders, Recommendations, Directives, or policy determinations as may from time to time be issued by the Petroleum Administration for War."

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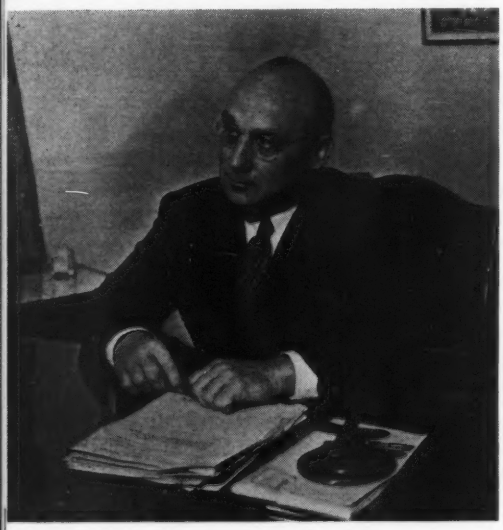
Oil Workers are War Workers.

Alvin Zwerneman

## Axelson Announces Executive Changes

Announcement has just been made by J. G. Axelson, President of the Axelson Manufacturing Company that Alvin "Dutch" Zwerneman, Vice President and associated with the Axelson organization for the past 20 years, is severing his company association for a Washington, D. C. connection. He left California July 15 for Washington to become associated with the PAW under the leadership of Frank A. Watts, Director of Material. Mr. Zwerneman's title will be that of special assistant to the director of material and he will represent the petroleum equipment manufacturers and suppliers. It is understood that his work will have to do with the coordinating of raw material sources for manufacturers of petroleum industry equipment. In this position, Mr. Zwerneman would be eminently qualified due to his close connection with the equipment industry and his wide acquaintanceship in the oil industry. Mr. Zwerneman's appointment is the result of a special meeting of the Petroleum Equipment Dealers' Association held in Dallas, Texas, April 23, 1943. At that time a resolution was adopted to recommend to PAW that a special section be created in the office of the Director of Material to deal with the needs and problems of petroleum equipment manufacturers and suppliers. The resolution further stipulated that such section be staffed in part by outstanding men from the industries affected. Zwerneman's place is being taken by Ken S. Ramey, who will act as temporary California Sales Manager. Ramey is another Axelson veteran who will undoubtedly carry on efficiently the work which Zwerneman is giving up. He has been with the Axelson organization for over 20 years, and he has worked in all California districts. His headquarters will now be at the Los Angeles plant.



Ken S. Ramey

Mr. Zwerneman, for the time being, is leaving his family in California and doesn't plan to establish residence, at least at this time, in Washington. Mr. Axelson in speaking of Zwerneman's new responsibility said, "The work which Dutch is undertaking is extremely important and must be done by a man qualified and thoroughly familiar with the various problems which confront all oil field equipment manufacturers today. We are sure that he will acquit himself with credit in this particular work and will be of great assistance to all manufacturers to whom a source of raw materials continues to be a problem."

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Oil Workers are War Workers.

## Huizinga Joins The National Supply Company

Mr. A. T. Huizinga has resigned as Assistant Treasurer of Montgomery Ward & Company to become Treasurer of The National Supply Company at Pittsburgh, Pa.

Following his association with a group of Chicago banks from 1920 to 1928, Mr. Huizinga was connected with the Harris Trust and Savings Bank of Chicago from 1928 to 1932.

A. T. Huizinga

During this time he was active in the American Bankers' Association, the Financial Advertisers' Association, and a director in the American Institute of Banking.

Mr. Huizinga joined Montgomery Ward & Company in 1932 and was elected Assistant Treasurer in 1934, which position he has held until the present time. He has been active in civic affairs in Chicago, being a divisional chairman of the Community Fund for many years, a member of the Board of Managers of the YMCA of Chicago, and an officer of several other philanthropic organizations.

The National Supply Company is the largest manufacturer and distributor of oil field machinery and equipment.

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A million tons of sugar could be obtained from the sawdust and other waste products of the timber cut annually in the United States.

# Pop Safety Valves in Compressor Cylinder Service

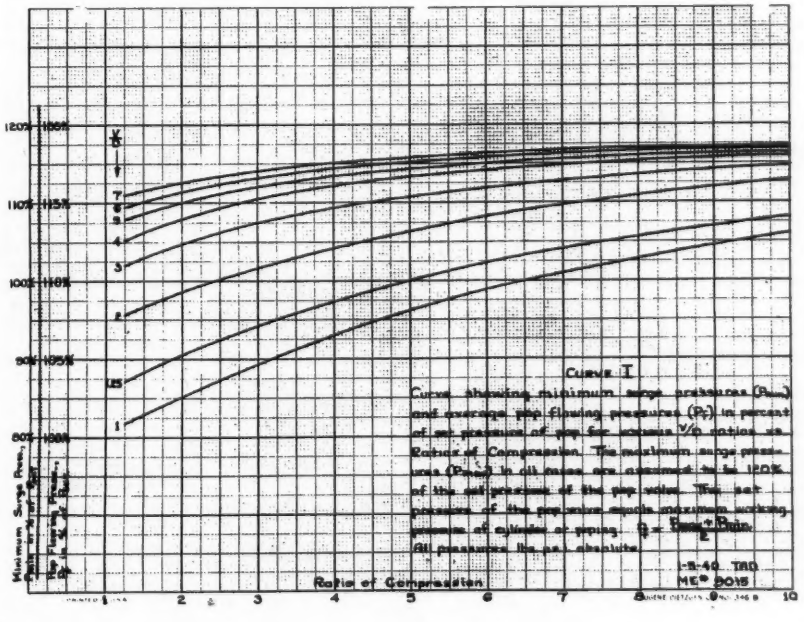
By R. S. Ridgway
Standard Oil Co. of Calif.
Presented before July, 1943, Meeting
C. N. G. A.
Rio Hondo Golf Club
Downey, Calif.

The use of pop safety valves for the protection of compressor cylinders is a practice we have never been able to escape. Their performance, however, is usually taken for granted, and they are fortunately, seldom called upon to completely fulfill their function. However, we must use them for our own protection, and therefore it should be to our advantage to know as much as possible about their performance when operating on compressor discharges if we are to make an intelligent selection of equipment. It is at least embarrassing to attempt to close the discharge valve on an operating cylinder, only to find that the pressure rises well above the danger point. It should be of economic advantage to know the smallest pop valve which can safely be used for any specific application. If there are any features of the compressor installation which would ease the load on the pops or permit us to use smaller ones, we should know them. For such reasons as these we made an investigation into the performance of pop safety valves when relieving compressor cylinders, and the findings presented herewith are what we learned from this project conducted three years ago.

At the outset, I would like to make myself clear on nomenclature. At present there is controversy over the nomenclature of such equipment, "Safety valves", "pop valves", "pop safety valves" and "relief valves" being the more common names applied. Those of the "old school" still think of relief valves as those used on hydraulic services, and having no "popping" characteristics because there is no huddling chamber, nozzle or reaction throat employed on such a valve. Lately, some of the manufacturers are trying to standardize on the term "safety valve" if the equipment is used on a boiler. For any other service (even on a steam line) they would like to have the valve called a "relief valve". We do not choose to enter into this controversy, and feel that we make ourselves clear with the term "pop valve", even though it may not be strictly correct.

In order to learn the performance of the pop when serving the compressor it was first necessary that we know accurately the capacity of the pops which were to be used in the tests. Flow tests were made, and the results pointed at once to the reason why many of our pops would not relieve cylinders when the manufacturers published capacity tables had been used in calculating the size required. On many of the old style pops the actual capacity fell short of the rated capacity by a very wide margin, some of the actual volumes being as low as 40% of the published rating. If you have old style pops on your compressors which have been engineered from old capacity tables, we suggest that you contact the supplier and endeavor to obtain A.S.M.E. capacity charts on this equipment. Since some of these old valves were first sold, the makers have conducted certified A.S.M.E. tests on them, and the capacities thus determined can be depended upon as being 90% of the actual capacity of the pop. If you are not satisfied with this data, then the safest thing is to flow test the valves in question. This is not always easy to do. Fortunately we were able to use a metered stack line for our tests. If flow testing is contemplated, however, we would warn you to have your experimental setup checked with the manufacturer to avoid any possible loss of capacity by starvation to the valve.

The mechanics of the operation of a compressor cylinder discharging its gas into a closed header to be handled by a pop valve of the proper size is that of intermittently filling



a vessel which is being discharged continuously. This causes a rising and falling pressure within the vessel. Because the discharge gas "jacket" around the cylinder is always a part of this vessel, and because the bore itself during the time of discharge is also a part of the vessel, the upper limit of this pressure concerns us greatly. We can calculate fairly well what these pressures will be. Assume that the volume of the discharge header including the gas jacket is represented by V, and that the still unswept volume of the cylinder when the compressor valves start to open is $V_d$. If the main shut-off valve or cock were closed and the pop were not operating, the pressure in the cylinder would be forced up from some absolute discharge pressure $P_{min}$ to $P_y$ by the following expression:

$$P_y = P_{min}\left[\frac{V_d+V}{V}\right]^n$$

With the pop valve in operation, however, $P_y$ will be decreased by the volume which flows through the pop during the time, $t_d$, (which is the time required for the piston to sweep out the volume $V_d$). This is predicated upon the assumption that all the gas handled by the cylinder is exactly equivalent to the capacity of the pop at the average flowing pressure. Also that the volume of gas discharged by the pop in time $t_d$ is

$$V_d \times \frac{t_d}{t_D},$$

where $t_D$ is the time for ½ revolution of the compressor. Converting this to hot free gas, this term becomes

$$V_d \times \frac{t_d}{t_D} \times \frac{P_{wp}}{14.7},$$

where $P_{wp}$ is the maximum working pressure of the cylinder, expressed on an absolute pressure basis. The slight error introduced by assuming that the pop flows at $P_{wp}$ can be neglected. The pressure resulting from

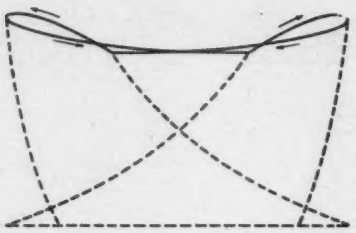


Fig. 1

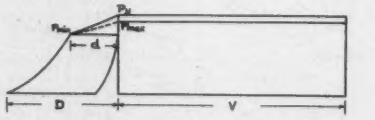
the removal of the volume handled by the pop in this time $t_d$ will reduce $P_y$ to $P_{max}$ as follows:

$$P_{max} = P_y - \frac{V_d \times t_d \times P_{wp}}{V \times t_D}$$

This will permit us to give the expression in terms of $P_{max}$ and $P_{min}$ by combining, and will thus define our limits of surge.

$$P_{max} = P_{min}\left[\frac{V_d+V}{V}\right]^n - \frac{V_d \times t_d \times P_{wp}}{V \times t_D}$$

All of the following data is based on the assumption that the maximum working pressure of the compressor cylinder is the limiting pressure to which the pop valve must protect. Wherever the rest of the piping, the valves, or the pop valve itself has a lower maximum working pressure than the cylinder, the maximum working pressure of the weakest unit will of course have to govern. Since all compressor cylinders are hydrostatically tested to 50% over their maximum rated working pressure by the Manufacturer, and since in normal compressor operation, surges within cylinders frequently run 20% above discharge pressure, we feel justified in permitting the surge pressure caused by the pop valve to exceed the maximum




(1) $P_y = P_{min}\left(\frac{V_d+V}{V}\right)^n$ (4) $P_{min} = P_{wp}\frac{\left[1.2+\frac{V_d \times t_d}{V \times t_D}\right]}{\left[\frac{V+V_d}{V}\right]^n}$

(2) $P_{max} = P_y - \frac{V_d \times t_d \times P_{wp}}{V \times t_D}$

(3) $P_{max} = P_{min}\left(\frac{V_d+V}{V}\right)^n - \frac{V_d \times t_d \times P_{wp}}{V \times t_D}$

Fig. 2

rated working pressure of the cylinder by a similar 20%. In view of these considerations this allowance should be quite reasonable when it is considered that pop valves in such installations are usually in operation for only a matter of seconds, or minutes at the most, and occur very infrequently. However, we are not attempting to persuade you to make a similar allowance, and we mention it here only because the curves which follow were all predicated upon this 120% maximum surge pressure. For any other maximum pressure allowance they can be sealed down directly. For convenience in calculating we have used absolute pressures (except for our largest cylinders) resulting in our statements that $P_{max} = 1.2\ P_{wp}$, lbs-p.s.i. abs. This assumption in no way seeks to raise the maximum working pressure of the cylinder, but merely places a reasonable upper limit on pressure surges.

With this assumption for the maximum surge pressure allowable within the cylinder, it was only necessary to substitute this value of $1.2\ P_{wp}$ for $P_{max}$, and get the general formula.

$$1.2\ P_{wp} = P_{min}\left[\frac{V-V_d}{V}\right]^n - \frac{V_d \times t_d \times P_{wp}}{V \times t_D}$$

Solving for $P_{min}$ we have an expression in terms of cylinder displacement, discharge volume, compressor speed, pop capacity, and pop set pressure (equal to $P_{wp}$) which now defines the lower limit of the surge, thus the surge limits and its magnitude are known.

$$P_{min} = P_{wp}\frac{\left[1.2-\frac{V_d \times t_d}{V \times t_D}\right]}{\left[\frac{V-V_d}{V}\right]^n}$$

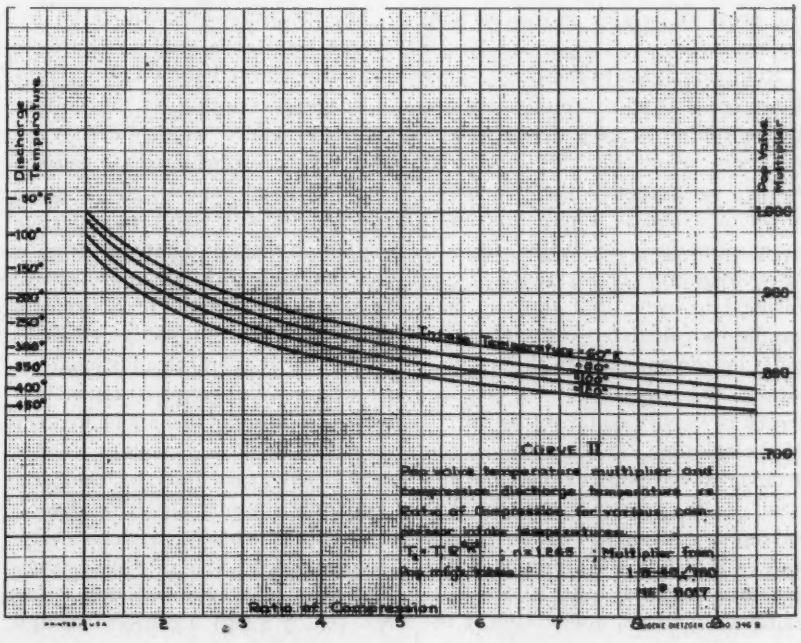
We found that when we knew the actual pop capacity we could experimentally check the formula within the limits of experimental error and therefore concluded that the assumptions involved in deriving it were not too great and that we could expect similar action in any other cylinder.

Having established this formula we used it to compute the expected percent of surge, determining the minimum pressures in percent of $P_{wp}$, always giving a value of 1.2 $P_{wp}$ for the Maximum. We computed this for V/D ratios from 1.25 to 7. This V/D ratio which we found to be so important, and which we use so frequently throughout this paper, is the ratio of the volume of the discharge header up to the main shutoff valve, plus the volume of the discharge gas jacket of the cylinder, to the displacement of the cylinder for one-half revolution of the compressor. By our own measurements and discussions with manufacturers we feel it safe to assume that the volume of the gas jacket is ½ D. Because of the difference in volume of gas handled by the cylinder with different ratios of compression, we extended the computations through ratios of compression from 1.25 to 10. Plotting this data, Curve I shows the minimum pressure within the cylinder and header for given V/D ratios and ratios of compression, **when the maximum pressure is always 1.2 $P_{wp}$.** If we assume that the flowing pressure of the pop can be the mean of these two pressures, this curve will also provide the proper flowing pressure which, in many cases, can be higher than the working pressure of the cylinder, therefore obtaining a higher capacity of the pop than when assuming the flowing pressure to be at the normal pop rating of 5% above the working pressure of the cylinder. These allowable increases in flowing pressure under the most advantageous conditions may be as high as 15% above working pressure. Their significance lies in the fact that with higher flowing pressures, given valves have higher capacities.

If we include our suggested practice of allowing the surge pressures to run up to 120% of the working pressure of the cylinder, there are then three different assumptions which can logically be made in selecting the pop. With the aid of Curve I we can determine the relative size of the valves, and calculate the surge pressures in each case. The three cases are: first, where the maximum surge is allowed to rise to the 120% of rated working pressure, as we have noted; second, and this is the common method of making the selection, where the capacity of the pop is made equal to the capacity of the cylinder at a set pressure equal to the maximum working pressure of the cylinder; and third, where the maximum surge is held at the maximum working pressure of the cylinder. The pop valve which is required to fit each case will be smallest for the first and largest for the last. A typical example will illustrate. Assume we are to find a pop to be used on a cylinder whose maximum rated working pressure is 100 lbs. absolute, having a V/D ratio of 2, and a ratio of compression of 2.5. In case one, assuming a 120% surge pressure allowance, we note from the curve that the minimum surge pressure is 100% or 100 lbs. The pop flowing pressure is found to be 110%, or 110 lbs. The set pressure of the pop must be at least 5% below this point to provide the "Accumulation", though normally we would set the pop at the maximum working pressure of the cylinder, or 100 lbs.

In case two, the "Ordinary" one, a pop was selected whose rated capacity would be equal to that of the cylinder at the maximum working pressure of the latter. With an "Accumulation" or "Overpressure" of 5%, the pop would then handle the gas at 105% of working pressure. In our example this is 105 lbs. and compares with 110 lbs. for case one. The pop in the second case must be larger by approximately the ratio of the two flowing pressures. The maximum and minimum surge pressures are readily found by multiplying the curve values by the ratio of the two flowing pressures, or 105/110. Maximum surge, then, instead of being 120 lbs. is 114.5 lbs. Minimum surge instead of being 100 lbs. is 95.5 lbs. It is of importance to note from these examples that in all cases except the extremes shown on the lower left hand region of Curve I, where flowing pressures may be less than 105% of the working pressure, a pop selected for the normal case two is larger than necessary for case one. If the 120% surge pressure is allowed, the maximum surges with the case two pop will not attain this pressure, and such a selection may be considered a safe one.

In case three, when we limit the



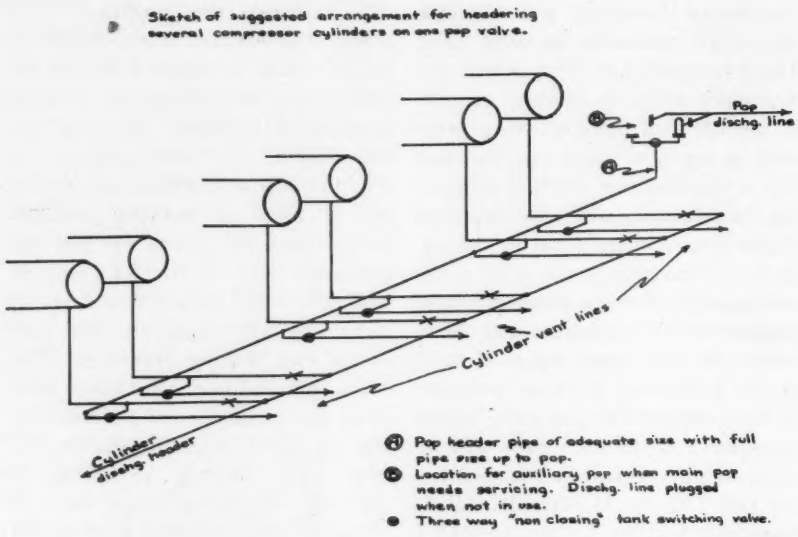

Sketch of suggested arrangement for headering several compressor cylinders on one pop valve.
Pop dischg. line
Cylinder vent lines
Cylinder dischg. header
Pop header pipe of adequate size with full pipe size up to pop.
Location for auxiliary pop when main pop needs servicing. Dischg. line plugged when not in use.
Three way "non closing" tank switching valve.

FIG. 3 1-24-40/TRD ME* 9029

maximum surge pressure to the maximum working pressure of the cylinder, all the curve values must be reduced by the ratio of 100/120, because we are dropping the maximum surge by this ratio. Using our same example, this case requires a pop whose flowing pressure is 91.5 lbs. (as compared to 105 lbs. for case two and 110 lbs. for case one). Minimum surge pressure falls to 83.3 lbs. If the flowing pressure is 91.5 lbs., the set pressure must be 5% below, or 87.2 lbs. As well as requiring the largest pop, this case further reduces the maximum working pressure by 13% in this particular example.

Referring again to the surge Curve I we see that at a few low regions the minimum surge pressure is seen to drop below the .96 $P_{wp}$ point (which is normally the 4% blowdown of a pop). Where this minimum pressure falls below .96, the blowdown must be increased to correspond in order that the pop may handle its calculated capacity, for it must be remembered in these calculations the capacity of the pop selected is exactly equal to the output of the cylinder. This capacity is not attained if the pop is closed for any point in its cycle of operation. For example, with a V/D ratio of 1.25 and an R of 1.25, the minimum surge pressure is found to be .87 $P_{wp}$. Because the valve is always set at the working pressure of the cylinder (even though it may be calculated for flow at some higher pressure) the blowdown must therefore be 1.00 - .87, or 13%. For conditions involving low V/D ratios or a low R, consult Curve I for blowdown.

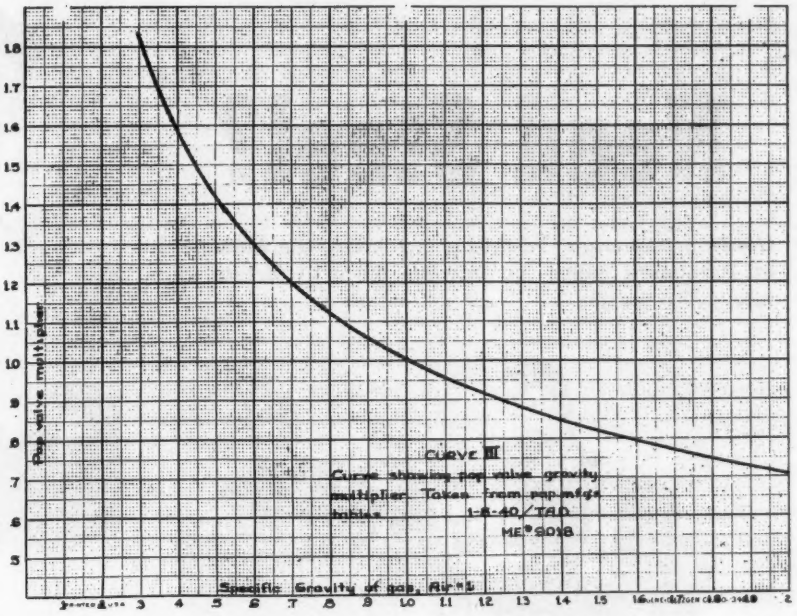
This data was computed for a cylinder having 5% clearance. Cylinders of greater clearance will have a still smaller surge, and therefore a valve calculated on the above surge table will be still safer for a cylinder of greater clearance. For this reason, computations on cylinders with larger clearances were neglected.

The advantage of having large discharge headers is readily seen from our surge Curve I showing the range of surge pressures. As the volume ratio of header to cylinder, V/D, goes up the surges decrease, permitting increased capacity for a given pop, greater safety and smoother operation. From our computations and experimental work, the improvement beyond a V/D ratio of 5 becomes rather small and probably cannot be justified if it requires additional expenditure. We suggest that in new work, an attempt be made to keep this ratio up to 5, inasmuch as it is usually governed only by the location of the shutoff gate valve or cock.

To experimentally check the calculated pressures and pressure surges that exist in a cylinder while being relieved by a pop, a compressor unit was equipped with extra discharge header capacity which could be used at will by valving. This unit had two 16x16 plate valve cylinders. The piping arrangement allowed either or both cylinders to be tested with one or several pops. With the installed header arrangement it was possible on one cylinder to get four different V/D ratios from 1.26 to 3.87. Five different 2" and one 1¼", pops were used in the tests to eliminate the idiosyncracies of any one valve. Numerous indicator cards were taken and scaled to determine the pressures occurring in both the cylinder and the discharge header under various conditions. Tests covering the regions of the surge curve which could be verified with our experimental setup were run. When discharging through a pop the pressure rises within the cylinder until the end of a stroke is reached. When pressure surges due to phenomenon other than pop valves are observed, they usually occur at the beginning of the compressor discharge stroke, and when they so occur do not interfere with the surges created by the pop. Many other causes serve to create pressure surges under certain conditions. This paper is only intended to deal with those set up by the action of the pop valve and its piping.

A check of your pop valve applications on compressor cylinders naturally reverts back to the valve itself. Many of you have new type high capacity pops. Some of you undoubtedly have old style pops in use. Periodically it is advisable to install a pressure gage on the discharge line and slowly close the discharge valve, being careful to see that the pressure does not exceed that which you consider allowable. When such tests are made try to have the maximum intake pressure on the cylinder which can be expected in practice. On many of our vacuum cylinders we calculate the capacity of the pop by assuming that a line break could admit atmospheric air. Obviously we do not care to duplicate this condition for test. When handling gas, the gravity correction factor must

be applied as a multiplying factor on the air capacity rating of the pop (Curve III). We have computed the final temperature of compression to be expected for gas of around 0.6 gravity knowing the initial temperature and ratio of compression and have shown this in Curve II. This is the temperature required for capacity computations, as it is the temperature entering the pop. It should be remembered, too, that because the set pressure of the pop is usually well above the normal discharge pressure of the cylinder, the ratio of compression involved is likely to be much higher than that normally used. In converting the capacity of a pop from air to gas, manufacturers further use a multiplying factor of .95.


Curve III
Curve showing pop value gravity multiplier. Taken from pop mfg's bulletin
1-8-40/TAD
ME-5018
Specific Gravity of gas, Air=1

There are a number of things to be watched in the application of both wing guided or top guided valves. For compressor cylinder service we usually prefer the top guided valve, principally because the wing guided valve with its wing in the stream is subject to coking. For other services the wing guided valve is not necessarily inferior. In many of our older wing guided valves we find that the seat continues to lift even beyond the 5% accumulative pressure which has been standardized upon for gas. For this reason many of your old wing guided pops are capable of handling more gas when working at a high overpressure. To illustrate, such a pop would handle more gas when set at 87½ lbs. and flowed at 105 lbs., which is 20% overpressure, than when set at 100 lb. and flowed at 105 lbs., which is the rated 5% "Overpressure" or "Accumulation". The volume increase by the former setting is more than 20%. If you have old pops to use which follow these characteristics, the advantage of high overpressures can usually be realized. Set the popping pressure just safely above the operating pressure, and not up to the safe working pressure of the cylinder which is usually somewhat higher. The difference in flow rate can often mean the use of a pop already on hand. Most of the old wing guided pops which give high increases in volume with high overpressures require more than the normal 4% blowdown. We found that where the 5% overpressure was exceeded, 10% blowdown should be given to assure full capacity. Normally, a high blowdown is no handicap for a pop protecting a compressor cylinder unless the set pressure is being carried very close to the operating discharge pressure, and the latter is fluctuating. With the old pops we found the action to be smoother and more positive with high blowdown, hence we recommend carrying 10% wherever it is practical.

The top guided nozzle or reaction type pop is somewhat different from the wing guided valve. Its capacity is very high and it is consistent in its operation. The advantages of overpressure, over and above the rated 5%, are negligible with respect to capacity. Nor could we find any capacity increase with blowdown increased beyond the rated 4%.

Perhaps as important a factor as any to be stressed is the restriction of the pop discharge. Piping should be as short as possible and never smaller than the pop discharge opening. If pressure is built up within the bonnet of a pop, the capacity will be restricted. To overcome this trouble, some manufacturers have provided threaded openings in the bonnet so that the gas which leaks into it can be piped away. Others have provided a small hole to bleed such gas into the discharge line. Still others have done nothing at all in this regard. No pop should ever have a pressure in the discharge line of more than 50% of that under the seat. And if the bonnet is not vented to the outside, a discharge pressure of more than 10% will usually restrict the capacity. Some pops with tight bonnets will suffer a reduction of capacity even though there is no discharge piping at all unless the bonnets are vented to atmosphere. Nor is this phenomenon necessarily limited to old style pops. In our flow tests we used two, modern, top guided valves of different make. Neither had bleeder holes connecting the bonnet with the discharge. One was provided with a half inch pipe plug in the bonnet. With only a short length of pipe on the discharge and the bonnet plugged, this pop flowed from 70% to 85% of its rated capacity. When the plug was removed, the capacity ranged from 20 to 35% above the rated capacity. The other pop had no vent hole whatever, and tested 95% of its rated flow. When we drilled a hole into the bonnet and vented it to the air, the valve flowed its rated volume

# Need Steel?

***Here's a true story***—Yesterday my boss—the Manager of Purchases, called me into his office to dictate an inter-office memo.

"Mary," he said, "send this to all of our local buyers — and send carbons to the branch plants. Subject — STEEL PURCHASES.

"One of Jorgensen's salesmen was in this morning and mentioned that while they are still out of some items, their stocks are now in much better shape than at any time during the past year.

"In view of their improved stock position, and in order to save time, I suggest that you call Jorgensen first for our steel requirements."

## And He's Right!

**Jorgensen's stocks ARE in an improved condition. Simplify your purchasing problems — Call JORGENSEN FIRST — for steel.**

**EARLE M. JORGENSEN CO.**

**STEEL**

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AIRCRAFT ALLOY STEELS COMMERCIAL ALLOY STEELS MILD STEEL STAINLESS STEELS ABRASIVE RESISTING STEELS COLD FINISHED STEELS
MAYARI R HIGH TENSILE STEELS CARBON STEELS TOOL STEELS MINING DRILL STEELS BARS BILLETS PLATES SHEETS STRUCTURALS

and in some cases exceeded this by 6%.

In making our installation of pops for compressor cylinder relief there may be times when considerable saving can be effected by using a single pop line connected to a number of cylinders working in parallel through 3-way valves. These valves (figure 3) are located on tees branching from the compressor discharge lines ahead of the main discharge valves, and turn discharge gas either into the general pop line, or to a bleeder which vents these cylinders to atmosphere. It is very important that there 3-way valves be of the "Overlapping" type so that there will be no mid-position point where the valve may close off both outlets. Such valves are commonly known as "Tank Switching" valves (figure 4). At the end of the pop line one or two large pops are installed instead of small ones on each individual cylinder. Aside from the saving in pops effected by such an installation, it is obvious that this setup will automatically give a good V/D ratio, and that if all the cylinders are popping at once, the valve will be operating near its capacity with a smoothed-out flow due to the large volume of "V" and the multiple action of several cylinders. If only one cylinder is popping, the large excess of capacity will assure adequate relief even if the flow is broken up by alternate opening and closing.

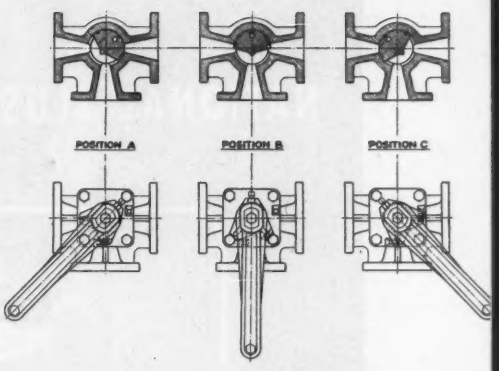
The use of one pop with two or more cylinders which are headered together will similarly make smoother operation for the pop and decrease the magnitude of the pressure surges, provided that the pistons of the cylinders so grouped are not in phase or in 180° relationship. If they are, the relations of Curve I will hold directly for such an installation.

After a pop has been selected, fitted with the proper spring for the working range desired, and set for popping pressure and correct blowdown it should be tested on the compressor to insure that these settings have been made correctly, and that it will flow the calculated volume of gas within pressure limitations imposed. The use of a spring out of its range completely upsets the flowing capacities of most pop valves. Some manufacturers use a different spring for liquids than for gases. The user should in all cases be completely satisfied that the spring installed in the valve is the correct one for his conditions.

Because of the effects of slight misadjustment, the possibility of getting the wrong spring, the differences between valves which appear to be identical etc., we urge that in every installation the valve be made to flow the maximum volume which may ever be expected of it, making sure that the operating pressures are satisfactory.

Check the set pressure by slowly closing the discharge valve until the valve actually begins to pop. The topmost swing of the gauge needle must be taken for set pressure, though due to inertia of the gauge this is probably not exact. Do not confuse the "simmer" of the pop with the actual set of "popping" pressure. Gradually opening the discharge valve will indicate a pressure on the gauge where the valve closes. This can be taken for blowdown pressure.

With the discharge valve closed the intake pressure should be built up to that calculated for this cylinder-pop combination in order to check the internal pressures. At speeds of 150 RPM and upwards it will be very difficult to check maximum and minimum surge pressures from a gauge. It will be found safer and more practical to determine a mean pressure from the swing of the gauge and assume this mean pressure to be the flowing pressure of the pop. If this flowing pressure thus found is higher than that calculated, it can be assumed that the pop is not handling the calculated volume, and therefore the maximum surge pressure is going above 1.2 $P_{WP}$. The intake pressure allowable must then be reduced to a point where the observed flowing pressure checks the curve, or else the pop must be worked over until test conditions satisfy the calculated pressures.



SWITCHING VALVE - 90° OPERATING

FIG. 4

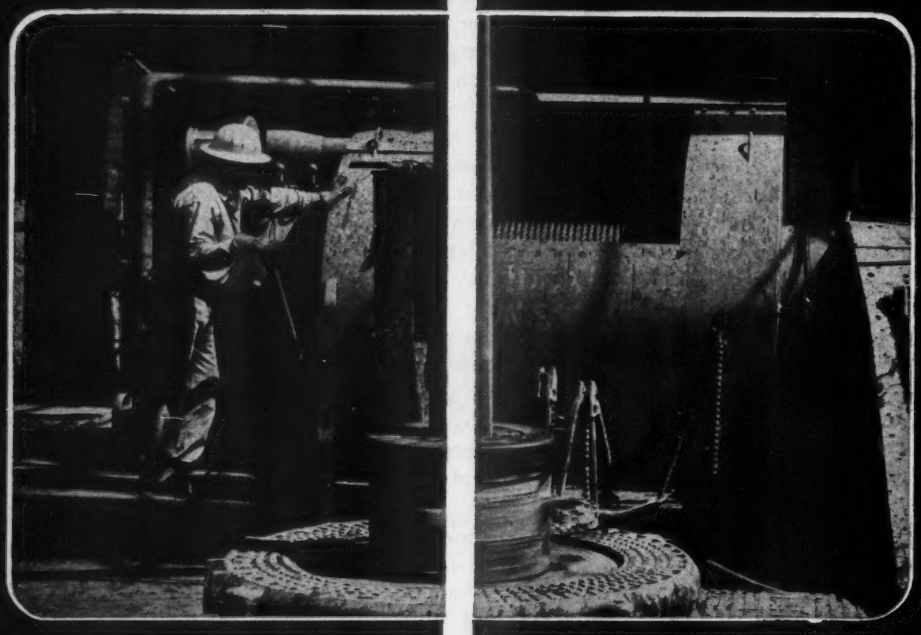
In some instances surge phenomena of the gases upset or build upon the pressures calculated from cylinder and pop performance. These phenomena are too complicated to warrant calculating. When pressures are forced upwards from such causes, the effective capacity of the valve must be decreased. The allowable intake pressure, then, is reduced to a point where the flowing pressure checks the curve value.

Most of you will recall Tom Dunlap, a former member of this organization who is now in the aviation industry in Dallas. You may have noticed his initials on the curves presented. He collaborated in the test and theoretical work on this project and should be credited with a large share of the findings.

C.N.G.A. meets regularly the first Thursday of each month at Rio Hondo Golf Club, 607 North Old River School Road, Downey. Dinner at 6 P.M., meeting at 7:30 P.M. Meetings open to all those interested.

"America," as a ship's name, has always been popular. It dates from 1851 when we entered the sloop "America" in an international yacht race and won the cup. The name continues down to 1940, when the new queen of our merchant fleet, the "America," was completed, the largest vessel ever to be built in the United States. She is now on war duty as a transport.

# NATIONAL SLUSH PUMPS KEEP THINGS MOVING...



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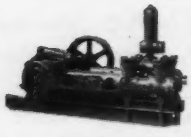
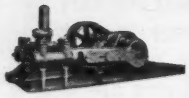
**THE IDEAL TYPE D-50**

Designed for slush service on shallow rotary and seismograph rigs—has operating convenience and dependability of larger slush pumps—5" x 10" bore and stroke—1000 pounds maximum working pressure—50 maximum rated hydraulic horsepower at 60 r.p.m.



**THE IDEAL TYPE C-150**

For portable and semi-portable rigs and semi-shallow drilling—6¼" x 12" bore and stroke—2000 pounds maximum working pressure—150 maximum rated hydraulic horsepower at 65 r.p.m.—Due to higher operating speeds will deliver a greater amount of fluid at higher pressures and less hose whip.



**THE IDEAL TYPE C-350**

For the deepest regular drilling—7¾" x 18" bore and stroke—3000 pounds maximum working pressure—350 pounds maximum rated hydraulic horsepower at 55 r.p.m.—power and pressure ratings allow duplication of corresponding size steam pump performance.

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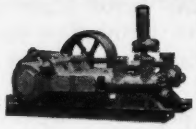
The continued extension of rotary drilling into the shallower fields and the trend to reduced diameter holes have created a demand for a smaller power driven slush pump with the same relative drilling efficiency as the larger deep hole types. The Ideal Type C-100 Power Driven Slush Pump is especially made for these requirements. It has the same general design as the larger Ideal Type C Power Driven Slush Pumps—10" x 5¾" bore and stroke—1500 pounds maximum working pressure—100 maximum rated hydraulic horsepower at 65 r.p.m.



**THE IDEAL TYPE C-250**

For ordinary deep drilling requirements—7¼" x 15" bore and stroke—2500 pounds maximum working pressure—250 maximum rated hydraulic horsepower at 60 r.p.m.—Adaptable to all types prime movers—shorter, more portable with no sacrifice in volume and pressures.

| Model No. | Max. Liner Size | Stroke | Max. Working Pressure | Pressure Rating of Fluid End Liner | Rated Speed | Rated H. P. | Weight Pounds |
|---|---|---|---|---|---|---|---|
| D-50 | 5" | 10 | 1,000 | 450 | 60 | 50 | 5,725 |
| C-100 | 6¼" | 10 | 1,500 | 520 | 65 | 100 | 12,250 |
| C-150 | 6¼" | 12 | 2,000 | 550 | 65 | 150 | 17,000 |
| C-250 | 7¼" | 15 | 2,500 | 710 | 60 | 250 | 28,975 |
| C-350 | 7¾" | 18 | 3,000 | 800 | 55 | 350 | 36,400 |

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# Crude Oil Prices and Conservation

By
John D. Gill*
The Atlantic Refining Company and Chairman Committee on Cost and Price Adjustment, Petroleum Industry War Council
before
Quarterly Meeting, Interstate Oil Compact Commission

Many countries will be saved from vandalism, and their peoples from terrorism, massacre and enslavement, by the practice of the principles of conservation evolved by the personnel of the oil industry and the oil regulating bodies of the states which ratified the Compact creating your Commission.

That eventuality establishes the importance of conservation. Now the practice of conservation is threatened by the Federal price control agency's current policy concerning petroleum prices. To outline the possible serious ultimate consequences of that policy is my present purpose.

I need not take time to tell you how necessary oil is to quick victory over our powerful enemies. It is sufficient to say that we will win the war by our use of unprecedented amounts of oil, vastly exceeding the oil avails of the Axis powers. Currently, the American oil industry can produce, conservatively, that is, without waste, approximately 4,600,000 barrels of oil a day. If it were forced to abandon completely the practice of conservation, as it might have been forced to do if our enemies had been more successful in their attempts to capture the oil resources of other countries, it could produce a substantially greater quantity daily. There would be no question of a shortage of oil with which to bring the war to an early successful termination and with the minimum loss of life and property of the United Nations. We could veritably deluge our enemies with petroleum.

The practice of conservation during most of the last eighteen years has led the industry to discover nearly 15 billion barrels of oil in excess of the quantity it has produced. By this means its proven reserves have been increased from 5,300,000,000 barrels at the beginning of 1925 to a little more than 20 billion barrels at the beginning of the present year.

Perhaps it is the existence of this vast productive capacity which has made the Office of Price Administration turn a nearly deaf ear to the industry's petition for a measure of the proved effective means of stimulating the search for additional reserves. That agency exercises vast powers over the production processes of the oil industry through the control of the prices of its raw materials and products. But the very complacency of the agency threatens a breakdown in the practice of the principles of conservation which this Commission, its underlying state agencies, and the personnel of the petroleum industry have labored so strenuously to perfect. It is because of the close relation between the practice of conservation principles and the practice of price policies that at this time the members of this Commission must of necessity possess a lively interest in the latter policies, as they have heretofore in the former practices.

Were it not for the conservative methods of oil field development, and of crude oil withdrawals from reserves, which the Commission has so unreservedly sponsored, the oil industry even now might be moving heaven and earth to discover and develop additional oil reserves with which to stave off the enemy. And believe me, if one can judge from the obvious willingness of the Army and Navy to pay productively stimulating prices for the munitions of war which are urgently required, the efforts to find and develop crude oil reserves would not be restricted by a price policy established to achieve some entirely different and non-productive purpose.

Because of devotion to the anti-inflationary fetish and the complacency to which I have referred, no weighty measures have been adopted for the stimulation of the search for oil, although some exceedingly fantastic suggestions for the subsidization[1] of selected elements of our business have been proposed; and no very effective changes have been made in prices of crude oils, except to a limited extent in the California producing area.

Before proceeding with a discussion of the intimate relation which exists between the prices of petroleum and the conservation of this resource, I should like to offer for your consideration a few figures which establish the validity of the statements already made. At the beginning of the year 1925, according to a generally accepted estimate, the domestic petroleum industry possessed a proven oil reserve of 5,321,427,000 barrels. That reserve was drawn upon freely without regard to the principles of conservation subsequently evolved and promulgated and slowly woven into the practices of the industry. Over the next eighteen years, that is, to the first of this year, the industry discovered reserves estimated to yield by conservative methods of production 33,455,778,000 barrels of oil. During this period, the industry produced 18,694,412,000 barrels of oil from the total reserve, by methods each year more and more in accord with the principles of conservation. Consequently, the underground inventory of proven oil increased by 14,761,366,000 barrels. At the beginning of 1943 the reserve contained 20,082,793,000 barrels. Had the industry continued during the eighteen years after January 1, 1925 the production practices in vogue at the beginning of the period, and had the demand upon it been as reported, there would have been discovered

*E. T. Knight, The Atlantic Refining Company, collaborating on the calculations.

[1]See "Memoranda on the Crude Oil Price Situation", PIWC, especially article by A. Jacobsen.

reserves which in all probability ultimately would have yielded only 20,006,052,000 barrels by those now outmoded production methods. As of the first of this year the proven reserve would have been only about 6,700,000,000 barrels, which is all the reserve necessary for the production of today's supply on a wide-open flow basis, if each year about as much oil is discovered as is produced. However, the industry and the public would be subjected to all the effects of the vicissitudes of discovery, including violent changes in prices, a characteristic of the industry's affairs over many decades.

Now note please that the difference between the 33 odd billion barrels, which the industry believes it discovered during this period, and the 20 odd billion barrels which it would have reported as discoveries while exerting itself to supply the 18 odd billion barrels of actual demand, is, to a considerable extent, maybe nearly to the full extent of the 13 odd billion barrel difference, oil that was saved to the country by the practice of the principles of conservation. This vast conservation increment is placed in jeopardy by a price control policy which ignores the needs of the industry for additions, through price increases, to the revolving fund employed for the whole process of finding oil. Existing reserves are threatened with wasteful depletion as the result of the declining[2] fruitfulness of discovery efforts.

It is conceivable that in the event of an indefinite prolongation of the war, making ever-increasing demands upon the petroleum industry, that withdrawals each year would continue to exceed discoveries; would force the industry to resort to the rapid exhaustion of reserves by practices abhorrent to this Commission, bringing about a loss of all, or most, of the 13 billion barrels of reserves which the industry has husbanded through the practice of the principles of conservation. This is a possible price that the public would have to pay for the negation of the Petroleum Administrator's recommendation for a general crude oil price increase of 35c per barrel, which is less than .085c per gallon.

During recent years, indeed continuously to the present time, the production of crude oil has proceeded in an orderly way without the free flowing of wells, or other excessively rapid and wasteful exhaustion of reserves, and, with only minor exceptions, at rates at or below the estimated maximum efficient rates of production. These facts seem to support a view that no one has cause for remonstrance with the price agency's negation of a general crude oil price increase on the ground that the negation weakens[3] the practice of conservation. They may satisfy those who pride themselves on being realists, as well as conservationists, with a strong bent to a rigid national price policy, because they are all the facts. But true realists and true conservationists deal not only with the facts of the past and the present moment, but also with the probabilities of the future. The probabilities have been forecast by the long-experienced and competent personnel of the crude oil price study group of the Cost and Price Adjustment Committee of the Petroleum Industry War Council, and by the crude oil production specialists of the Office of the Petroleum Administrator for War. I shall not here go into the details of their reasoning. Their main conclusions may be expressed briefly, as follows:

1. In the near future the demand for petroleum will exceed the currently available maximum efficient supply, necessitating resort to wasteful production;
2. Because of increases in virtually all of the items of cost in the search for and development of reserves, and especially because of the increasing effort required to achieve any given volume of discovery, the capital[4] costs of crude oil properties and the operating costs of producing crude yet to be discovered will be measurably higher than the costs that attach to the reserves heretofore discovered and developed.

But the probabilities cannot be proved. The Office of Price Administration does not consider them inherently factual. Therefore, they are of little concern to that agency. Complacency continues to obsess its mind.

The chief reason for the price control agency's negation of the industry's claim for an upward adjustment in ceiling prices may grow out of the fact that it is the servant of two masters, and like the servant of the biblical parable, must cleave to one and despise the other. The two masters are respectively: first, the hold-the-line policy of the executive branch of the federal government; and, second, volumes of production necessary to the highest welfare of the nation. Its price policies must serve both masters. The price agency appears to be very much more concerned about the effect of an increase in the price of petroleum upon the hold-the-line policy than upon the industry's ability to satisfy, without waste, all demands upon it, or upon the financial status of producers who are forced now to produce oil for prices which will not yield replacement costs.

The hold-the-line policy, therefore, becomes the primary master and the volume of production to satisfy demand the secondary one. But this is not to say that in its disregard for this secondary master, the agency in charge of price control would openly sponsor, or even indifferently acquiesce to the wasteful production of properties. No doubt that agency would exercise itself to avoid such imputation. But if the committee of the PIWC and

[3]See Report "On the Study of the Crude Oil Price Structure to Determine Those Factors Which can be Expected to Stimulate and Increase the Rate of Discovery of New Reserves of Crude Oil" by the Committee on Cost and Price Adjustment to the Petroleum Industry War Council, February 3, 1943; See E. De Golyer, before the Annual Meeting, A.I.M.M.E., February 18, 1943.

[2]It appears highly significant that the Petroleum Administrator for War has certified, for June, 1943, generally lower production rates to the Eastern and Midwest producing states because of the **declining productive capacities** of the fields in those areas.

[4]The outlook is for replacement costs upwards of **one-third higher** than the capital costs of existing productive facilities. (Author).

the experts of PAW are right in their judgment regarding the imminence of a shortage of supply, an issue may be created which the Office of Price Administration cannot long ignore. Either crude oil must be wastefully produced in order to satisfy total demand, or total demand must be further reduced for the purpose of holding the line. Perhaps it is largely because of a leaning toward the second of these alternatives that the power to ration petroleum products has been invoked. Rationing for cause or by pretext has proceeded to such an extent that the entire demands of our military forces, which have multiplied an unimaginable number of times the peacetime volume, have been and continue to be met, by the deprivation of the civilian population. Indeed the 1943 civilian consumption probably will be 385 million barrels less than it would have been had the war not altered the relatively even tenor of our ways.

If the deprivation of civilians were the only course open for the most vigorous prosecution of the war, there would, of course, be no issue. But the severe restriction of civilian consumption in nearly all parts of the country should be unnecessary; restriction operates to increase the inflationary gap, so abhorrent to the price administration; and in a significant way does violence to the principles of conservation broadly interpreted in terms of the welfare of the people.

When petroleum products are wisely used, many opportunities for a fuller, richer life are provided. I need not attempt to detail the effect of the petroleum-propelled and lubricated automobile upon the development of our American society. It has made possible the better education of our children, especially in rural communities by replacing the one-roomed school by the consolidated school. It has increased the accessibility of natural economic resources and of forest and field, mountain and lake; brought a freer social mingling of the people; broken down some barriers between them; and has been the basis for a certain economic progress subtly brought about by the intensification of competition as buyers have been enabled to compare values offered by merchants in different parts of large towns and of merchants in one town with those of another.

Now it well might be that the impacts of the war, which brought about a reduction in the usually employed oil transportation facilities available to the Eastern section of the United States; and the loss, for the time being, of our accustomed source of rubber, might have forced a rigorous restriction in the use of gasoline in that area. But the loss of transportation had little, and the loss of our rubber supply had nothing directly to do with the restrictions in the consumption of that fraction of crude petroleum which ordinarily is employed for the heating of homes and other peopled buildings. For the year, 1943, the normal expected demand for oils for this purpose totals 238 million barrels. But it appears now that the avails will be more than 69 million barrels, or 29% short of the requirements. This is a serious curtailment which reduces the conveniences and comforts of living and jeopardizes the health of those persons whose homes and places of occupation are heated by petroleum.

From even this brief statement it must be clear that just as "price" is intimately related to the conservation of petroleum, so it is related to conservation in the broad sense of the term.[5] Price determines the character and extent of use and of the competition of other commodities. It also determines the amount of effort which may be expended in the search for reserves, for production therefrom, for transportation and refining. Price always has been the factor which equated supply and demand. In peacetime, price has been a variable moving to any level necessary to perform its equalizing function. But at present the cart and horse are reversed. Price is no longer the free moving variable to equate supply and demand, but is a constant to restrict the supply to a preconceived total of demand. This is a condition unfortunate for civilians hungry for petroleum products, but it is the case.

If federal control of prices were concerned only with the maximum wartime production of goods in order of their essentiality, there is no doubt that in the light of diminishing discoveries of new reserves for any given volume of exploratory effort, and in further view of the imminence of a shortage of supply, the price control agency would long ago have accorded a general increase in the prices of crude petroleums and their products.

But it is conceded that from the viewpoint of the hold-the-linists, the problem of the prices of crude petroleum should not be considered apart from its relations to the price problems of other elements of the economy. The impact of changes in one set of commodity prices upon the costs of many other commodities, and hence upon many other prices, is too well understood to need restating here. However, when the control of the prices of a natural resource like petroleum and its derived products is part of a general price freezing policy, production is stifled as emphasis is placed more and more upon the main objective, price immobility. When an increase in any price is refused because of an assumed or possible effect on other prices in a system which brooks no change in average price, we have, to say the least, an impasse. We experience a diminution in economic welfare.

Moreover, there is a source of cost increases in the case of petroleum which is not related to changes in the unit prices of goods and services entering into its discovery and production. I refer, of course, again to that increment of cost arising out of the increasing difficulty of finding oil. This is a condition peculiar to petroleum. It should be recognized by the price control authorities and due allowance made for it. Relative-

[5] I have not time even to touch upon the effect which a flexible price policy might have had upon the supply both of transportation and of rubber.

ly moderate changes in prices, possible now to effect a gradual extension of productive capacity, would avoid violent changes in prices necessitated by shortages developed otherwise in the future. Violent price changes have always been accompanied by inefficiency and waste, the antithesis of conservation.

Our industry has learned to live under controls on its crude oil production processes. Indeed many of the present oil field controls have been initiated by the industry; all of them have been implemented by regulations promulgated by appropriate bodies of the Compact member states. But these controls have in the main been either of a police-power nature or designed to deal solely with technical aspects of crude oil production in order that perfection might be approached in the practice of the principles of conservation. Economic control, to the extent that it has been exercised, has been incidental. The over-all result has been relative freedom from violent changes in the factors of price, supply and demand, except as these have been affected by external forces. But now we are faced with Federal economic controls of factors which are not readily susceptible to expression in formulas by technical experts—factors which logically change with the interplay of competitive forces, freely exercised.

Profound, perplexing questions are following in the wake of our current experiences. Many of them will go unanswered in the event of an early termination of the war and a prompt return to a wholesome degree of economic freedom. But there are other questions which must be answered soon if the prospect is for an indefinite prolongation of the war. Some of them center around the character of the existing price control. How long will crude prices be kept at their 1937 price level while the average of all commodity prices is now 20.5% above the 1937 level? How much oil can we afford to waste or what further restriction of civilian consumption impose in order to avoid raising petroleum products prices by about 7%?[6] How much of this grand experiment in the wartime control of the economy will be carried over into peacetime and with what effect? Some of us will have to answer these questions.

---

[6]The proposed general price increase is 0.833c per gallon, equal to 7.2 per cent of the average tax-paid price of petroleum products, 11.6c per gallon. On the 1942 volume of domestic consumption, the proposed increase would equal 0.3 per cent of the 1942 value of the Gross National Product of $151,600,000,000.


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# SAVE PARTS and STEEL

## CONCENTRATE CONTROL with the GRAY COMPOSITE MANIFOLD

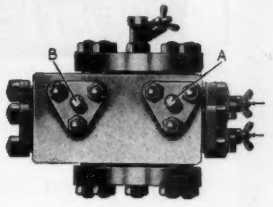
The Gray Composite Manifold is a Christmas Tree and flow line manifold all in one. Concentration of parts in this Composite Manifold effects true economy and saves steel without sacrificing control. It contains four valves and two chokes—all removable—mounted into a single unit. This manifold replaces 4 valves, 2 chokes, a cross, 2 unions, 5 T's, 4 bull plugs, 10 nipples—28 separate parts in the conventional tree.

The Gray Composite Manifold is 345 lbs. of concentrated control, as against the conventional Christmas Tree, weighing 600 to 1,500 lbs. This Gray Composite Manifold is a 2-wing Christmas Tree. You can change chokes without stopping flow from the well.

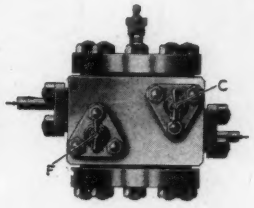
The views above show all sides of this Composite Manifold, which contains two independent flow passages with a common inlet from the tubing and a common outlet for the flow line. One of these passages is at the upper level, the other at the lower level. The valves, plugs, and choke in the upper level communicate with one passage. Valves, etc. at the lower level communicate with the other passage.

To change chokes in the upper level, close Valves A and B, then remove Plug C. To change chokes in the lower level, close Valves D and E, remove Plug F. Valves A and D correspond to the wing valves on a conventional Christmas Tree. Valves B and E correspond to flow line valves, which are closed when changing chokes. All valves in the assembly are interchangeable.

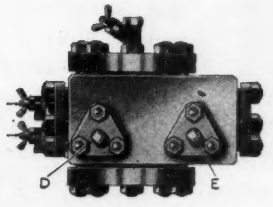
For full details about this steel-saving Gray Composite Manifold and other units in the coordinated Gray Systems of Well Control, write to Gray Tool Company, P. O. Box 1655, Houston, Texas.



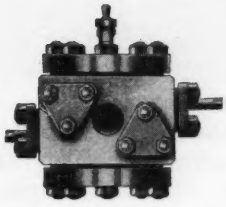

Left Hand Side



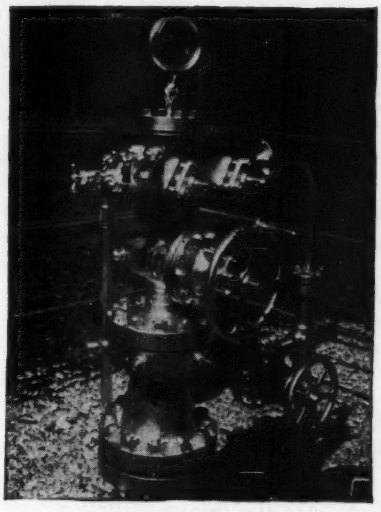

Front View




Right Hand Side



Rear View



Concentrated Control with the Gray Composite Manifold

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HOUSTON, TEXAS

West Coast Distributor: WAGNER-MOREHOUSE, INC., Los Angeles
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**TO SAVE NATURAL RESOURCES AND CRITICAL MATERIALS IN PEACETIME MAKES GOOD BUSINESS SENSE; TO SAVE NATURAL RESOURCES AND VITAL MATERIALS IN WARTIME BECOMES A PATRIOTIC OBLIGATION.**

# THIS LAUGH

# OFF!!

The driller took Pat, the new toolie, back to the forge to dress a bit. When it was heated and in position he said, above the roar of the blower, "When I nod my head, hit it hard with this sledge hammer." Pat did . . . and when the driller recovered Pat had no job.

---

Here's to the chigger,
The bug that's no bigger
Than the point of an undersized pin,
But the welt that he raises
Sure itches like blazes,
And that's where the rub comes in.

---

The teacher was having her trials and finally wrote the mother: "Your son is the brightest boy in my class, but he is also the most mischievous. What shall I do?"

The reply came duly: "Do as you please. I am having my own troubles with his father."

---

She—What is the meaning of the three R's?

He—At 25 it's Romance, at 45 it's Rent, at 65 it's Rheumatism.

---

And then there was the Scotchman who was married in the back yard so the chickens would have the rice.

---

An employer was trying to find out from one of his negro workers why he objected so strenuously to working on Saturday night:

"George, you are willing to work on Saturday afternoons, Sunday afternoons and Sunday night, when necessary. Now why don't you want to work on Saturday nights?"

"Well, Boss, if you had ever been a colored man on Saturday night you wouldn't ever want to be a white man again as long as you live."

Why did Mary have a little lamb? Because she couldn't pass a buck.

---

A customer sat down to a table in a smart restaurant and tied his napkin around his neck. The manager, scandalized, called a boy and said to him:

"Try to make him understand, as tactfully as possible, that that's not done."

Boy (seriously to customer): "A shave or hair cut, sir?"

---

"Is this a picture of your fiancee?"
"Yes."
"She must be very wealthy."

---

They are talking about the couple who had just had twins.

"And to think," said one lady, "twins happen only once in 50,199 times."

"My," said another, "when does she have time for her housework?"

---

"How is it Bill never takes you to movies any more?"

"Well, one evening it rained and we stayed home."

---

Patron: "I'll take the dollar dinner."

Waiter: "On white or rye bread?"

---

After hearing the chaplain's forceful sermon on the Ten Commandments the beautiful young thing was in a serious mood. "Well, anyway," she said, "I haven't made any graven images."

---

The soldier wrote home to his mother: "The food in this camp is absolutely poison," adding, "and such small portions."

---

Never question your wife's judgment—look at the man she married.

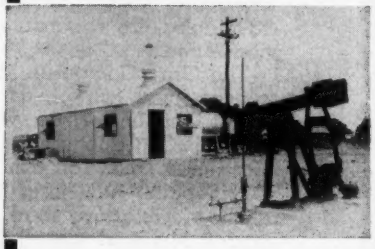
Do you think it is good luck to pick up pins?

Not if the gal they're fastened onto objects.

---

Familiarity breeds ATTEMPT.


**Symbol of Good Production Management**



Wherever you see a JENSEN Pumping Unit bobbing away in the oil fields, you can say to yourself, "There is a producer who has taken time to discover for himself the most economical and efficient way in the world to pump an oil well."

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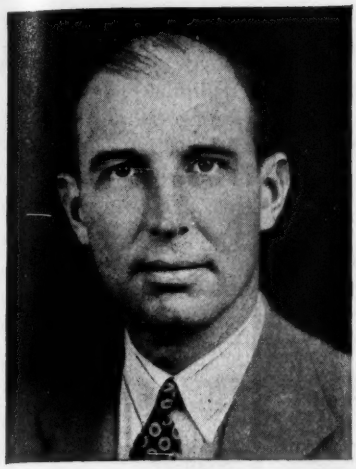


B. E. Hilliard

## Hilliard in Charge of BJ Export Office

B. E. (Ben) Hilliard has been placed in charge of the New York Export Office of the Oil Tool Division of Byron Jackson Co., located at 420 Lexington Avenue, New York City. Mr. Hilliard formerly was in charge of the West Texas and Kansas territories for BJ Oil Tools.

## Davies Announces New Appointments

Appointment of James E. Pew as assistant director of the Division of Natural Gas and Natural Gasoline in the Petroleum Administration for War was announced on July 3rd by Deputy Administrator Ralph K. Davies.

Mr. Pew succeeds Paul M. Raigorodsky, who resigned on June 30. Succeeding Mr. Pew as chief of the Natural Gasoline Section of the Division is Charles E. Webber.

The new assistant director has had 20 years experience in the natural gas and natural gasoline industry. Born in Pittsburgh in 1900, he was educated in the public schools of that city and then attended Cornell University and the Massachusetts Institute of Technology.

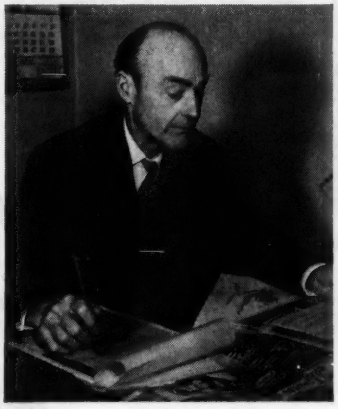
Mr. Pew was called to the PAW in January 1942, as a member of the Production Division. When the Natural Gas and Natural Gasoline Division was formed in June 1942, he was made chief of the Natural Gasoline Section.

Mr. Webber was born in Stillwater, Okla., and was educated in Pittsburgh, Pa., and Baton Rouge, La. He received an M. A. in Chemical Engineering from Louisiana State University in 1934. He was employed by the Humble Oil and Refining Co., from 1934 until June 1942, when he joined the PAW as assistant to Mr. Pew in the Natural Gasoline Section.

## John L. York Is Clark Advertising Manager

Clark Bros. Co., Inc., of Olean, New York, have recently announced the appointment of Mr. John L. York as Advertising Manager.

Mr. York has had many years of experience in the advertising field. He studied art at the Art Institute of Chicago and worked with one of the leading illustrators of the country for a number of years acquiring a considerable knowledge of advertising layout, illustration and copy.



John L. York

Following this experience, he served with the Waltham Watch Company both in this country and in England and later as Advertising Manager of the Watson Company of Attleboro, Massachusetts, and of the Metro Stations, Inc., now part of the Socony Vacuum Oil Company. He also served for short periods with advertising agencies.

J. B. Reilly

## J. B. Reilly Placed on Rotary International Board

J. B. Reilly, President of Fluid Packed Pump Company, was recently elected a board member of Rotary International at the club's annual convention held in St. Louis.

Reilly, a pioneer oil man, was reared in the California fields and has been in the oil tool business all his life. He has held many responsible local and district positions in Rotary, and his elevation to International Board member climaxes many years of untiring effort in furthering the club's interests.

## Marcello A. King Now With Worthington

Worthington Pump and Machinery Corporation announces that Marcello A. King has joined the organization as Executive Engineer of its Moore Steam Turbine Division, Wellsville, New York, in charge of design, research, testing, and service. Engaged in turbine engineering and manufacture since his graduation from the University of Michigan in 1916, he was with the Kerr Turbine Company and later with the Elliott Company where he held the position of Manager of Engineering. Mr. King has been active in trade association work and is widely known in the steam power field.

# THE EXECUTIVE WHO STOPS TO THINK . . .

## *Knows that "10% for War Bonds isn't enough these days"*

Workers' Living Costs going up . . . and Income and Victory Tax now deducted at source for thousands of workers . . .

Check! You're perfectly right . . . but all these burdens are more than balanced by *much higher* FAMILY INCOMES *for most of your workers!*

Millions of new workers have entered the picture. Millions of women who never worked before. Millions of others who never began to earn what they are getting today!

A 10% Pay-Roll Allotment for War Bonds from the wages of the family bread-winner is one thing—*a 10% Pay-Roll Allotment from each of several workers in the same family is quite another matter!* Why, in many such cases, it could well be jacked up to 30%—50% or even more of the family's *new* money!

That's why the Treasury Department now urges you to revise your War Bond *thinking*—and your War Bond *selling*—on the basis of *family* incomes. The current War Bond campaign is built around the family unit—and labor-management sales programs should be revised accordingly.

For details get in touch with your local War Savings Staff which will supply you with all necessary material for the proper presentation of the new plan.

Last year's bonds got us started—*this year's bonds are to win!* So let's all raise our sights, and get going. If we all pull together, we'll put it over with a bang!

This space is a contribution to America's all-out war effort by

**CALIFORNIA OIL WORLD**

you've done your bit
. . . now do your best!

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

## Wirt Franklin Joins P.A.W.

Petroleum Administrator Harold L. Ickes announced on July 7th that Wirt Franklin, District Director of Production and Director in Charge for District Two (Middle West), has accepted the highly important post of Special Field Assistant, attached to the Deputy Petroleum Administrator's office of the Petroleum Administration for War.

"The Nation is threatened with an imminent shortage of crude oil production," explained Deputy Administrator Davies, "and it is of paramount importance that the Petroleum Administration for War further expand its activities in such a manner as to bring about, so far as lies within its power, increased search for oil, the installation of greatly expanded secondary recovery operations, and the further encouragement of conservation practices. We will need every possible barrel of oil which we can find and extract from known deposits.

"We are particularly fortunate in having on the staff of PAW a man whose lifetime experience in the oil industry has so well prepared him to aid us in this important task. While the vacancy which he leaves as Director in Charge of District Two will be difficult to fill, the urgent necessity of improving the Nation's production position is such that we have asked Mr. Franklin to apply his unique training and experience to a problem national rather than local in scope."

During his many years of activity, Mr. Franklin was known as one of the most prominent and successful wildcatters in the oil industry. Commencing with the discovery of the famous Healdton Pool in Oklahoma over three decades ago and continuing through the development of many of the most important Mid-continent fields, Mr. Franklin's record has been outstanding. It was in a large measure as a result of his exploratory activities that the great Oklahoma City field was discovered in 1928.

Mr. Franklin was also one of the founders and the first president of the Independent Petroleum Association of America, which office he held for many years. He was Chairman of the Planning and Coordination Committee during the days of the petroleum code.

Mr. Franklin's official headquarters will be in Washington, but it is expected that the greater portion of his time will be spent in the field with the producers and the producing companies.

Mr. Franklin has been an independent oil operator before he entered the Government service in the Fall of 1941. His home is in Ardmore, Oklahoma.

---

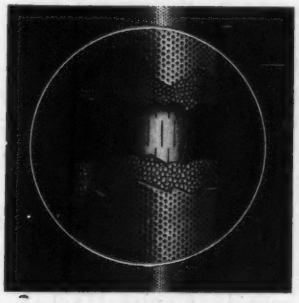
## Brundred Resigns From Spang Chalfant

Effective July 15, Mr. L. L. Brundred has resigned as General Manager of Sales, Spang Chalfant, Inc., Pittsburgh, Pa., to re-enter the oil business.


**Halt PREMATURE DESTRUCTION OF HARD-TO-GET PRODUCTION ITEMS!**

Normal equipment wear is one thing . . . but premature wear of pumps, liners, rods, tubing, and surface items that are difficult to replace today is wasteful, costly . . . **and unnecessary!**

Wherever sand is your problem, you can halt fast wear and tear of this equipment **at the source** by installing Pacific Pre-Packed Gravel Liners. In new or old wells, these Liners keep sand back in the formation where it belongs and filter every drop of oil that enters the well. You get sand-free production that stops pulling and cleaning jobs . . . keeps abrasion problems at a minimum.



Note these Pacific construction features, too—features that save on liner installation and insure years of trouble-free service: Durable, all-welded **sheet steel** outer screen. Uniform, efficient gravel pack, with gravel size selected for local sand conditions. Round, smooth, rigid construction that assures easy installation without ripping or collapsing. 33% effective open area—**more** than ordinary wire mesh. Wrought iron, Armco ingot iron, or rolled alloy steel screens for all conditions.

**Full details on Pacific Pre-Packed Liners are contained in illustrated folder, mailed without obligation on request. Write today!**

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"O. K. son, we won't let you down," wrote Charles C. Rogers, veteran Shell well puller, to his fighting son. Rogers, center, was photographed at work on Reyes 66, Dominguez field, with Alfred W. Hacker, left and Sidney J. Hambly, right.

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Frank S. Parker has opened offices at 1941 Palmerston Place, Los Angeles. Mr. Parker will specialize in geological service work, valuation, and petroleum production technology for independent companies on a consulting basis.

Until recently with Wilshire Co. as geological and petroleum engineer, Mr. Parker took engineering at both U. C. and U.C.L.A., with graduate work at Yale. In his early career he spent 4 years with U.S. G.S. mapping and publishing mining bulletins followed by work with the firm of La Barre and Converse surveying conditions affecting building foundations and dam sites. In 1934 he joined the Shell Oil Co. geological staff making nationwide surveys and through this work discovered heavy reserves at Yorba Linda for the company.

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# Field Development

## Los Angeles Basin

### Rice Canyon "Cat" Tests

General Pet. Corp.'s Mendota No. 1, on sec. 22-3n-16w in the old Rice Canyon field area, is swabbing frothy mud showing faint colors at 1345 ft. Scheduled to be a 6000 ft. wildcat the well paused at this depth to try shallow showings. A short section of liner was run below the shoe of surface casing at 710 ft. after several open hole formation tests failed with packers set at intervals between 1150 and 1300 ft.

### Brea-Olinda New Projects

Work in the Brea-Olinda field in recent months has been largely confined to Union Oil Co.'s Stearns lease where the company is rigging to spud No. 83. New work is however scheduled on other field sections. On the Naranjal lease, sec. 7-3s-9w, Union Oil Co. has foundation poured for No. 16 while on sec. 2-3s-10w Shell Oil Co., Inc., is planning Orange No. 22. Also scheduled is a redrill program by Fullerton Oil Co. with well No. 16 first to be worked over.

### Severns Drilling Gets Good East Coyote Well

Severns Drilling Co., Ltd., well No. C-2, on sec. 13-3s-10w, bottomed at 4323 ft. and gun perforated a full string of 6⅝-in. casing in the interval 3615-3405 ft. to complete pumping 250 bbls. per day. No cuts had been taken at presstime but estimates place the net oil return at 175 bbls. per day with the cut showing an immediate disposition to decrease. The company will start at once on No. C-3 with K. L. Kellogg again the contractor.

On the same section Hathaway Company is building rig for an offset on acreage acquired from the Anaheim Union Water Co. Graham Loftus Oil Corp.'s nearby Perkins No. P-6 is pumping a net 95 bbls. of 17 gravity oil while No. P-5 is standing plugged at 3484 ft. after testing wet to bottom at 4407 ft.

In the extreme westerly field section Bartholmae Oil Corp. Stern No. 13 sanded up on initial trial at bottom of 4478 ft. and was last reported cleaned out and ready to resume trial. The company's No. 14 is coring brown shale at 5466 ft. while location has been graded for No. 15.

### Havenstrite to Test Del Valle Deep Job

R. E. Havenstrite will test Leibhart No. 1 on sec. 15-4n-17w at Del Valle. This well was deepened from 7255 ft.—on the strength of new deep zone production which the operator discovered in Barnes No. 1 on the adjacent section 16—and bottomed at 8519 ft. where drill pipe stuck. Unable to recover the fish below 8119 ft., the company landed and cemented 4¼-in. blank liner at 7700 ft. for gun perforation trials of oil sands cored in the interval 7604 to 7700 ft. Next operation will be well No. 3 on the westerly portion of the Barnes lease.

In the westerly field section Herley-Kelley's Orduno No. 1, sec. 18-

**LOS ANGELES BASIN WILDCATS**

| Area | Well | No. | Section | Depth | Status |
|---|---|---|---|---|---|
| Aliso Canyon | Standard Oil Co., Frew | 1-1 | 29, 3-16 | | Rigging up |
| Del Valle | Standard Oil Co., N.L. & F. | 3-1 | 19, 4-17 | | Rigging up |
| Las Llajas | Western Gulf Oil Co., Brady | 1 | 13, 3-17 | 9610 | Sidetracking |
| Montebello | Barnsdall Oil Co., Baldwin | 1 | 11, 2-11 | 302 | Drilling |
| | Cont. Oil Co., Baldwin | 1 | 3, 2-11 | 4827 | Fishing |
| Newhall | P. M. Girard, Fisher-Wosk | 1 | 6, 3-16 | 925 | Drilling |
| Norwalk | Gen. Pet. Corp., H. B. Allen | 1 | 12, 3-12 | | Location |
| Puente | Barry Oil Co., Inc., Rowland | 1 | 14, 2-10 | 2423 | Running tubing |
| | Hansen, Melvin, Dragna | 1 | 24, 2-10 | 3222 | Idle |
| | J. C. Drilling Co., Kelso | 1 | 12, 2-10 | 2385 | Sidetracking |
| | McCartney, Chas. E., Hurley | 1 | 4, 2-10 | 1250 | Drilling |
| | V. & F. Oil Co., Grazide | 1 | 27, 2-10 | | Location |
| Rice Canyon | General Pet. Corp., Mendota | 1 | 22, 3-16 | 1345 | Testing |
| Rosecrans | Union Oil Co., Amestoy | 1 | 18, 3-13 | 7856 | Drilling |
| | Shell Oil Co., Inc., Bank | 1 | 18, 3-13 | 6915 | Csg. cemented |
| Temescal | The Texas Co., Dominguez | 57-1 | 1, 4-18 | 5324 | Drilling |
| Whittier-La Habra | H. & C. Oil Co., Joyce | 1 | 22, 2-11 | 5760 | Drilling |
| | Los Nietos Valley O. Co., Woodward | 1 | 29, 2-11 | 3565 | Cleaning out |
| | **Orange County** | | | | |
| Newport Beach | Signal O. & G. Co., Willow Comm. | 1 | 19, 6-10 | 4445 | Drilling |
| | **San Bernardino County** | | | | |
| Chino | Chino Hills Oil Co., Kraemer | 1 | 33, 3-28 | | Location |

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4n-17w, is preparing to core ahead from a drilling break at 5194 ft. This well recovered substantial amounts of 18 gravity oil and a good gas blow on a formation test of the interval 4900-5054 ft. Ohio Oil Co.'s Vasquez No. 6 in the same section is drilling in grass root stages at 1476 ft. while Standard Oil Co.'s Sepulveda No. 5, also in section 17, does not appear promising since it is in hard shale at 9091 ft. without having encountered more than meagre showings. Bankline Oil Co.'s Handy No. 104, section 18 of the township, was last reported coring sand with a few oil stained streaks at 4800 ft.

## Standard To Drill El Segundo Well

Standard Oil Co. is preparing to drill a shallow well in the El Segundo field near the center of sec. 7-3s-14w on producing acreage recently acquired from A. S. Gough.

## Newport Beach Well Yet Drills

Signal Oil & Gas Co.'s Willow Comm. No. 1 at the northwest corner of the intersection of the Santa Ana River with the Coast Highway is still making hole. Last reported at an unfruitful 4445 ft. the well will be carried on as a deep try after apparently missing the shallow sands which Walt Elliott produces on the easterly bank of the river.

## Tideland Wells Hold Much Interest

New development of State owned tidelands in the Huntington Beach field holds the interest of many who look to these sands to further the heavy oil reserves so critically needed. Currently drilling on newly acquired State leases is Huntington State Co. under the direction of H. R. Hamilton, Operator. The company's State No. 1, located south of Ocean Avenue at 21st Street, is slanting seaward at 1200 ft. after cementing 13⅜ in. surface casing at 750 ft.

Further upshore Southwest Exploration Co., long time developer of State owned tidelands in this field, is completing its second Jones sand well. Bottomed at a reported 4001 ft. with casing at 2541 ft. the well will probably remain a production enigma since the operator refuses information concerning the development of this zone. No production figures have to date been authentically released by Southwest on its first Jones sand well, No. J-10.

## Basin Oil Starts Potrero Deep Well

Basin Oil Co. has built rig for Potrero No. 14 on sec. 34-3s-9w as a deep test of already producing Potrero Country Club acreage. Bell & Loffland will contract the hole.

## Montebello Wells Working

Two tests of the Baldwin property east of Montebello and north of Whittier are under way. On section 3 of the township Continental Oil Co.'s well is fishing drill pipe after reaching 4827 ft. while on section 11 Barnsdall Oil Co.'s try is turning to the right after cementing 10¾ in. surface casing at 302 ft.

## Puente Well Rigs Pump

Barry Oil Co., Inc., Billy Rowland No. 1, sec. 14-2s-10w, which failed to establish commercial production at 2423 ft., is rigging pump for another try. Allowed to stand, the well took in clean oil allowing the fluid level to rise to 400 ft. Sands cored in this well are thought my many to afford reasonable chances of small commercial production, chances which were greatly reduced while drilling because of mechanical difficulties.

Drilling another shot at production in the area is Chas. E. McCartney on sec. 4-2s-10w. This well, Hurley No. 1, was last reported in shale at 1250 ft. Also working here is J. C. Drilling Co., which is sidetracking an old fish from 2059 ft. to recore showings in the 2385 ft. F. W. Kelso well on section 12 of the township.

# Coastal District

## Piru Wildcat Now Swabbing

The long delayed trial of Continental Oil Co.'s 7979 ft. Holser No. 2 on sec. 14-4n-18w is under way with disappointing results. At last report the well was swabbing mud and water with some gas and a trace of oil from open hole below the shoe of 5½ in. casing at 7815 ft. The try cored sands at 4020 and 4893 ft. which are behind pipe and again found sands at 7850 and 7900 ft. The well lies approximately 1000 ft. west of Holser No. 1 which made small amounts of 18 gravity oil from 4663 ft.

In the middle of the Temescal producing sector on sec. 4-4n-18w, Pacific Western Oil Corp. Temescal No. 14 is yet coring to depth below the normal shallow producing sands after finding them in place in this hole. At last report the bottom was 8213 ft. in gray sand and sandy siltstone.

On section 14 of the township Standard Oil Co.'s Crestmont No. 1 will explore to depth and was last reported at 4241 ft. in shale. Some dead tar sands were cored and unsuccessfully tested in the upper Miocene near 1491 ft.

## Torrey Canyon Test Drilling

Union Oil Co. Torrey No. 60 is drilling and coring at 2909 ft. This test lies in the almost inaccessible Torrey Canyon on sec. 5-3n-18w. Circulation which was bothering is now restored and while some sands have been cored they contained no promise.

Still further west, in Wiley Canyon, Wilshire Oil Co. is grading roads to a site for Ford No. 1 on sec. 1-3n-19w.

## Cat Canyon Well Flows

Pacific Western Oil Corp. completed Los Alamos No. 22 on sec. 36-9n-33w of the Cat Canyon field. Bottomed at 5550 ft. the well came in flowing 1368 bbls. daily and after 10 days was making 609 bbls. of clean 19 gravity oil through a 48/64 in. bean. The company is already under way with No. 23, now drilling after cementing surface casing at 335 ft.

## East Gato Ridge Well Producing

General Petroleum Corp., which persisted in East Gato Ridge wildcatting, was rewarded with small returns when its redrilled Wickenden No. 2, sec. 24-8n-32w, completed at plugged depth of 4125 ft. pumping 35 bbls. of 12 gravity oil in 20 hours by circulating distillate. At last report the well was circulating distillate and washing perforations in an effort to better the heavy yield.

## More Santa Barbara County "Cats" Work

Work in several related sections of Santa Barbara county is under way. In the East Purisima Hills area Whittier Associates Barham No. 1, sec. 11-7n-32w, is drilling in shale showing oil in the fractures at 2966 ft. This well, now in the Miocene appears promising of successful completion to those who have carefully watched ditch and core returns.

To the east on sec. 7-7n-30w Hub Oil Co.'s Los Olivos area try, La Laguna No. 1, is completing rigging up after making a 50 ft. technical spud. South of the first well The Texas Co. is preparing to drill Petan Investment Co. No. 1 on sec. 20-6n-32w for a test of a portion of Rancho Santa Rosa. In the Tina-

**COASTAL COUNTIES WILDCATS**

| Area | Well | No. | Section | Depth | Status |
|---|---|---|---|---|---|
| | **Santa Barbara County** | | | | |
| Casmalia | O.C. Field Gas. Corp., Arellanes | 1-F | 13, 9-35 | 1898 | Drilling |
| Gato Ridge | General Pet. Corp., Wickenden | 2 | 24, 8-32 | 5189 | Bailing |
| Lompoc | Alphonzo E. Bell Corp., Lompoc | 7 | 28, 8-34 | 2584 | Drilling |
| Los Olivos | Hub Oil Co., La Laguna | 1 | 7, 7-30 | | Rigging up |
| Purisima Hills | Whittier Assoc., Barham | 1 | 11, 7-32 | 2966 | Drilling |
| Santa Rosa | The Texas Co., Petan Inv. | 1 | 20, 6-32 | | Location |
| Tinaquaic | Union Oil Co., Sisquoc C. H. | 1 | 31, 9-31 | 1700 | Drilling |
| | **Ventura County** | | | | |
| Conejo | L. A. Basin Oil Co., Well | 1 | 4, 1-20 | 1746 | Swabbing |
| Eureka Canyon | El Rika Oil Co., Well | 4 | 33, 4-18 | 463 | Rig pump |
| Fillmore | Standard O. Co., Fillmore Comm. | 2-1 | 24, 4-20 | 1511 | Drilling |
| Piru | Continental Oil Co., Holser | 2 | 14, 4-18 | 7979 | Swabbing |
| | Delroy Pet. Corp., Lisk | 3 | 22, 5-18 | 2808 | Idle |
| | Pac. West. O. Corp., Temescal | 14 | 4, 4-18 | 8213 | Drilling |
| | Standard Oil Co., Crestmont | 1 | 14, 4-18 | 4241 | Drilling |
| Rincon | Shell Oil Co., Inc., Tomson | 1 | 8, 3-24 | 9704 | Redrilling |
| Sespe | Volunteer Pet. Co., Tar Creek | 3 | 28, 5-19 | 780 | Reaming |
| South Mt. | F. E. Fairfield, S. M. | 1 | 19, 3-20 | 2907 | Drilling |
| Timber Canyon | A. T. Dennison, Well | 1 | 13, 4-21 | 2202 | Pumping |
| Torrey Canyon | Union Oil Co., Torrey | 60 | 5, 3-18 | 2909 | Drilling |
| Wiley Canyon | Wilshire Oil Co., Ford | 1 | 1, 3-19 | | Grading roads |

**NORTHERN COUNTIES WILDCATS**

| County | Well | No. | Section | Depth | Status |
|---|---|---|---|---|---|
| Contra Costa | Cal-Bay Corp., Faria | 1 | 21, 2n-1w | 196 | No report |
| | Standard Oil Co., Keller | 1 | 26, 2n-1e | 1939 | Drilling |
| | Trico O. & G., Trico-Signal | 1 | 4, 2n-3e | 3865 | Drilling |
| Glenn | Superior Oil Co., Dodge Land | 2 | 7, 19n-1e | 5882 | Abandoned |
| Monterey | Royalty Service Corp., Federal | 1 | 21, 24s-10e | | Rigging up |
| Sacramento | Amerada Pet. Corp., Capital Co. | 1 | 36, 5n-5e | 8367 | Completed |
| | Jergins Oil Co., McCormack | 1 | 30, 5n-5e | 5704 | Testing |
| San Joaquin | Amerada Pet. Corp., Comm. | 7-1 | 7, 4n-7e | | Grade |
| | Amerada Pet. Corp., Comm. | 15-1 | 15, 4n-7e | | Grade |
| | Amerada Pet. Corp., Comm. | 16-1 | 16, 4n-7e | 2700 | Testing |
| | Standard Oil Co., Holt Comm. | 1 | 15, 1n-5e | | Grade |
| Solano | Standard Oil Co., Honker Comm. | 1A | 25, 3n-1w | 3090 | Drilling |
| | Standard Oil Co., Suisun Comm. | 3 | 5, 3n-1w | | Location |
| | The Texas Co., Stewart | 74-7 | 7, 4n-1e | | Rigging up |
| Sutter | Shell Oil Co., Buttes Comm. | 1 | 2, 15n-1e | 4567 | Drilling |
| Tehama | The Texas Co., Walbridge | 1A | 32, 28n-2w | 2322 | Drilling |
| Yolo | Shell Oil Co., Inc., Glide | 1 | 15, 7n-3e | | Rig |
| | The Texas Co., Winchester Six | 1 | 20, 7n-4e | | Location |

quaic area Union Oil Co.'s Sisquoc Core Hole No. 1 is drilling at 1700 ft. in an effort to define the geologic possibilities of the area.

## Casmalia Well Works

O. C. Field Gasoline Corp. is drilling Arellanes No. 1-F on sec. 13-9n-35w near its plant in the Casmalia area. Last reported at 1898 ft. with 9⅝ in. casing standing cemented at 1550 ft. the try will be followed by Morganti No. 1 a few hundred feet to the southeast. In the Gato Ridge field the company's Texas Fee No. 2 has curtailed its difficulty in controlling sand and was last reported pumping 27 bbls. daily clean 14.6 gravity oil from 2792 ft. The company will soon put another well down in this field.

## Lompoc Well Cores Ahead

Alphonzo E. Bell Corp. is coring ahead in a fault zone at 2584 ft. in Lompoc No. 7. Located on sec. 28-8n-34w, near No. 6 which recovered heavy oil from 4905 ft., the current well tested limestone and shale horizons which showed oil in the interval 1926-2093 ft. but recovered only salt water. Allied operations under the name Bel-Air Oil Co. will soon start on the Donovan acreage in sec. 13-10n-35w of the Santa Maria Valley field.

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# More Valley

## Guijarral Well Yet Coring Sand

Standard Oil Co.'s Pleasant Valley No. 28-21F, on sec. 21-20s-16e in its newly discovered Eocene producing field—adjacent to Coalinga Eocene Pool production, cores ahead in oil sand at 9100 ft. after entering the zone at 8979 ft. and cementing 7 in. casing at the top.

R. S. Lytle's well, No. 86-20F, on section 20 of the township and most northerly yet drilled in the new area, is in Kreyenhagen shale at 7946 ft. after topping the age at 7210 ft., or 169 ft. higher than Standard's discovery well and 46 ft. higher than its own intervening producer No. 88-20F.

## Mettler To Drill Edison Area "Cat"

Em H. Mettler & Sons has awarded a drilling contract for the immediate drilling of a wildcat in the center of sec. 25-30s-29e a little more than a mile due south of the easterly section of the Edison field in Kern county.


*J. P. Butler*

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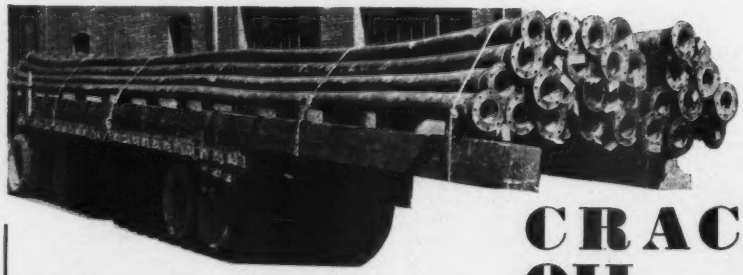

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# San Joaquin Valley

## Huron Joint Try Abandons

The General Pet. Corp.-Pure Oil Co. Sopac No. 81-9, in sec. 9-17s-17e some two miles southwest of the Helm field, was abandoned at 8835 ft. The Kreyenhagen was found at 8032 ft. and the Eocene at 8500 ft. with no formations reported carrying saturation.


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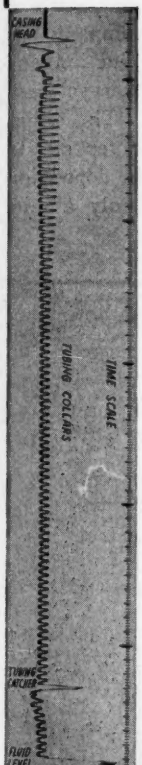


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## Raisin City Outpost Tests

Seaboard Oil Co.'s Raisin City outpost, shared by Tide Water and Union Oil Co.'s, was last reported drilling at 5700 ft. after a formation test of sands in the interval 5002-29 ft. flowed an estimated 15,000,000 cu. ft. of gas. The well is located on sec. 14-15s-17e approximately a mile west of the northerly tip of the field.

## Oil Search Continues In Grapevine District

Richfield Oil Corp.'s long range exploration program on its vast south valley holdings continues unabated. Predicated on extensive subsurface examinations which employed most of the recently perfected instruments-including the long used corehole—the program thus far has spawned five full hole dusters. The sixth project, Tejon No. 4, is located in the northwest corner of sec. 34-11n-19w a mile northeast of the old Grapevine Pool. This test is drilling in gray sand at 3846 ft. after having cored some 30 ft. of dead oil sands at the 3170 ft. level

Northwest of this play Kern Line Oil Co. indicates agreement with Richfield that production exists in the area by rigging up to redrill and deepen its 8390 ft. well on section 19-11n-19w. Some light gravity oil in non-commercial quantities was recovered on tests of this hole and present plans call for redrilling from 7000 ft. to approximately 9000 ft. for a recheck of the sand phases at depth.

## Paloma Driller Excites Interest

Western Gulf Oil Co.'s L. A. Club No. 36-1, an outpost try in sec. 1-32s-26e some 3000 ft. removed from the nearest east flank field production, is running casing to test sands cored from 11,120 to 11,212 ft. Presently bottomed in shale at 11,250 ft. the well is reported to have taken approximately 65 ft. of solid, rich looking oil sand in streaks throughout the zone. Running some 300 odd feet lower than the nearest producers, the well is considered to be a good shot at substantial black oil production rather than the condensate flowed from the cap of the structure. Some ambiguities are said to exist in geologic interpretations which conceivably may result in the well, if as successful as present opinions indicate, becoming an allied field discovery rather than an extension of present field limits.

**SAN JOAQUIN VALLEY WILDCATS**

| Area | Well | No. | Section | Depth | Status |
|---|---|---|---|---|---|
| | **Fresno County** | | | | |
| Huron | G. P.-Pure Oil Co., Sopac | 81-9 | 9, 17-17 | 8835 | Abandoned |
| Jacalitos | Standard Oil Co., Well | 67-17E | 17, 21-15 | | Rig |
| Guijarral Hills | Standard Oil Co., P.V. | 28-21F | 21, 20-16 | 9005 | Testing |
| | R. S. Lytle, Well | 86-20F | 20, 20-16 | 7610 | Drilling |
| Raisin City | Seaboard Oil Corp., S.T.U. | 53-14 | 14, 15-17 | 5700 | Drilling |
| | **Kern Coutny** | | | | |
| Belridge—South | Petromont Oil Corp., C.H. | 1 | 25, 28-20 | 575 | Abandoned |
| Buttonwillow | The Texas Co., Bowerbank U. | 3-8C | 8, 29-24 | 2656 | Drilling |
| Comanche Point | T. W. Burnham, Chiquita | 2 | 34, 12-19 | 1972 | Idle |
| Dyer Creek | D. D. Dunlap, Dyer Creek | 1 | 11, 26-27 | 2308 | Abandoning |
| Edison | Em H. Mettler & Sons, Mettler | 1 | 25, 30-29 | | Location |
| Elk Hills | Pac. West'n & G.F. Getty, McNeil | 1 | 22, 30-24 | | Location |
| Fellows | C.C.M.O. Co., Well | 11-7 | 7, 32-23 | | Grade |
| Grapevine | Richfield Oil Corp., Tejon | 4 | 34, 11-19 | 3845 | Drilling |
| | Kern Line Oil Co., Well | 1 | 19, 11-19 | 8390 | Rigging up |
| Kern Front | Kern Front Drlg. Co., U. S. | 1 | 10, 28-27 | | Location |
| McClung | Continental Oil Co., KCL | G-1 | 4, 30-26 | 5940 | Drilling |
| McKittrick | Standard Oil Co., Well | 89-7 | 7, 30-22 | 3720 | Abandoning |
| Mt. Poso | British American, U. S. | 2 | 34, 26-28 | 710 | Drilling |
| Paloma | Western Gulf Oil Co., L.A. Club | 36-1 | 1, 32-26 | 11195 | Drilling |
| Round Mt. | Harp & Brown, Olcese | 1 | 17, 28-29 | 1660 | Drilling |
| | Iseminger Bros. Recovery | 1 | 2, 28-28 | | Location |
| | **Kings County** | | | | |
| Hanford | The Texas Co., Souza | 14-33 | 33, 17-22 | 5475 | Drilling |

### C. C. M. O. Seeks Fellows Oil

C.C.M.O. Co. is preparing to drill well No. 11-7 near the north quarter corner of sec. 7-32s-23e. The well lies approximately a third of a mile west of Midway-Sunset field limits and due south of the town of Fellows.

Development within the adjacent field continues its newly established brisk pace with modest but profitable completions the general rule in the yet undrilled portions of the field.

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### Amerada Continues Fresno Co. Work

Amerada Pet. Corp. continues rapid development of its self-discovered Riverdale and Helm fields in Fresno county. Following a well established drilling program the rewards remain high in the face of difficult completion technology—a method which requires accurate gun perforating to establish clean production adjacent to sands carrying high water volume. Representative of the newer wells is Brum No. 78-15 on sec. 15-17s-19e at Riverdale which finished flowing 378 bbls. of clean 37 gravity oil and 285,000 cu. ft. of gas through a 12/64-in. bean.

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### British American Drills Poso "Cat"

British American Oil Prod. Co. is drilling U. S. No. 2 on sec. 34-26s-28e at 710 ft. Located at the east flank of northerly Mount Poso production, the well seeks a fault accumulation comparable to those which make up the East Valley fields.

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### Greeley Well Makes Good Flow

Superior Oil Co.'s Lewis No. 3 in the northerly section of the Greeley field was deepened to 11,490 ft. in oil sand and recompleted flowing a 1200 bbl. rate of clean 38 gravity oil and 792,000 cu. ft. rate of gas from a 16/64-in. bean.

South of the field Standard Oil Co.'s outpost KCL No. 12-6 is deepening at 12,510 ft. in hard shale. Once completed for a large oil return at 11,942 ft. the production turned to water and was abandoned until the current exploration was begun.

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### Tide Water Starts New East Strand Well

Tide Water Assoc. Oil Co. is preparing to drill KCL No. 54-8 near the center of sec. 8-30s-26e in its newly discovered East Strand field. The project is a quarter of a mile north of the initial well which flowed 1368 bbls. of clean 37 gravity oil through a 12/64-in. bean from 53 ft. of Stevens oil sand above a plug at 8185 ft. The company has already established production one location to the east in this yet geographically small field. The designation East Strand is given due to the fact that it varies in deposition from the Strand field only a mile to the west.


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